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Memo (Non-Bid)

To Board of Education

From Kyla Johnson-Trammell, Superintendent
Tadashi Nakadegawa, Director, Facilities Planning & Management Department

Board Meeting Date April 28, 2021

Subject Approval by the Board of Education of the Resolution and Addendum A to Amendment No.3 of the Facilities Lease Agreement- Cahill/Focon JV - Fremont High School New Construction Project Increment 4A- Division of Facilities Planning & Management Department

Action Requested Approval by the Board of Education of Resolution No. 2021-0207, Addendum A to Amendment No. 3 to the Facilities Lease Agreement, between the District and Cahill/Focon JV for Increment 4A to perform the work necessary for the Library Renovation Project on the Site for the Fremont High School New Construction Project in the additional amount of \$3,568,980.00 increasing Agreement not to exceed amount from \$95,301,226.00 to \$98,870,206.00, extending time of Agreement from September 27, 2017 through December 31, 2020 to December 31, 2021, (an additional 365 calendar days), and authorizing the President and Secretary of the Board to sign the Addendum to Amendment No.3 for same with said Consultant, pursuant to the Agreement. All other terms and conditions of the Agreement remain in full force and effect.

Discussion This is an Addendum to Amendment No. 3 of the Agreement which includes renovation of the library exterior and upgrades to the interior of the Administration Building which are parts of Increment 4A of the Project.

LBP (Local Business Participation Percentage) 82%

Recommendation Approval by the Board of Education of Resolution No. 2021-0207, Addendum A to Amendment No. 3 to the Facilities Lease Agreement, between the District and Cahill/Focon JV for Increment 4A to perform the work necessary for the Library Renovation Project on the Site for the Fremont High School New Construction Project in the additional amount of \$3,568,980.00 increasing Agreement not to exceed amount from \$95,301,226.00 to \$98,870,206.00, extending time of Agreement from September 27, 2017 through December 31, 2020 to December 31, 2021, (an additional 365 calendar days), and authorizing the President and Secretary of the Board to sign the Addendum to Amendment No.3 for same with said Consultant, pursuant to the Agreement. All other terms and conditions of the Agreement remain in full force and effect.

Fiscal Impact Fund 21 Measure J

Attachments

- Resolution
- Addendum A to Amendment No. 3
- Insurance Certificate
- Agreement

- Amendment No.1
- Amendment No. 2

**RESOLUTION OF THE
BOARD OF EDUCATION
OAKLAND UNIFIED SCHOOL DISTRICT**

RESOLUTION NO. 2021-0207

**RESOLUTION APPROVING INCREMENT 4A GUARANTEED MAXIMUM PRICE –
FREMONT HIGH SCHOOL NEW CONSTRUCTION PROJECT**

WHEREAS, the Oakland Unified District (“District”) is a California public school district subject to the California Education Code;

WHEREAS, the District is currently undertaking a project known as the Fremont High School New Construction Project (“Project”), located at 4610 Foothill Boulevard, Oakland, California 94601 (“Site”);

WHEREAS, following the Request for Qualifications and Proposals process and selection of prequalified contractor Cahill/Focon Joint Venture (“Cahill”), which included the District’s approved Best Value Methodology, on or about September 27, 2017, the District and Cahill entered into a Site Lease wherein the District leased the Site, as defined in Exhibits A and B to the Site Lease, to Cahill in order to perform the work necessary for the Project on the Site and to lease it back as more fully described in the Facilities Lease (“Site Lease”);

WHEREAS, on or about February 15, 2018, the District’s Board of Education (“Board”) approved the Guaranteed Maximum Price (“GMP”) for Increment 1 of the Project in the amount of \$7,093,095 and approved Amendment No. 1 to the Facilities Lease to incorporate the Increment 1 GMP;

WHEREAS, on or about June 27, 2018, the Board approved the GMP for Increment 2 of the Project in the amount of \$18,339,992 and approved Amendment No. 2 to the Facilities Lease to incorporate the Increment 2 GMP;

WHEREAS, on or about January 9, 2019, the Board approved the GMP for Increments 3 and 4 of the Project in the amount of \$69,868,139 and approved Amendment No. 3 to the Facilities Lease to incorporate the Increment 3 and 4 GMP;

WHEREAS, the District seeks to perform necessary improvements at the Site, which includes the modernization and waterproofing of the library facility at the Site in order to continue performing work on and achieve completion of the Project, identified as Increment 4A; and

WHEREAS, in accordance with Education Code section 17406 the District and Cahill have negotiated and finalized a GMP for Increment 4A of the Project in the amount of \$3,568,980 and seek to approve Addendum A to Amendment No. 3 to the Facilities Lease, attached hereto, in order to incorporate the Increment 4A GMP, rationale for that price and a construction schedule for Increment 4A.

NOW, THEREFORE, BE IT RESOLVED THAT, the Board of Education of the Oakland Unified School District does hereby resolve, determine, and order as follows:

Section 1. Recitals. All of the recitals above are true and correct.

Section 2. Determination and Basis for Award. Cahill’s proposal provides the best value to the District. This is the basis of the award.

Section 3. Best Interest Determination. As previously determined, this confirms that the Site Lease and Facilities Lease and incorporation of Addendum A to Amendment No. 3 to the Facilities Lease are in the best interest of the District.

Section 4. Addendum A to Amendment No. 3 to the Facilities Lease and Increment 4A GMP Approval. The Board has approved at a public meeting that the Site Lease and Facilities Lease contain objectively verifiable information regarding Cahill’s costs to perform all increments of the Project. Addendum A to Amendment No. 3 to the Facilities Lease, attached hereto as **Exhibit “A”**, is approved subject to any non-substantive revisions approved by staff and legal counsel.

Section 5. Authority to Execute. The President and the Secretary of the Board are authorized to execute and deliver Addendum A to Amendment No. 3 to the Facilities Lease and take any other actions necessary to effect the intent of this resolution and proceed with work on the Project.

Section 6. Effective Date. The Resolution shall take effect upon adoption.

PASSED AND ADOPTED, on April 28, 2021 by the Governing Board of the Oakland Unified School District by the following vote:

PREFERENTIAL AYE: Jessica Ramos (Student Director)

PREFERENTIAL NOE: None

PREFERENTIAL ABSTENTION: None

PREFERENTIAL RECUSE: None

AYES: Aimee Eng, Gary Yee, VanCedric Williams, Clifford Thompson, Vice President Benjamin "Sam" Davis, and President Shanthi Gonzales

NOES: None

ABSTAINED: Mike Hutchinson

RECUSED: None

ABSENT: Samantha Pal (Student Director)

CERTIFICATION

We hereby certify that the foregoing is a full, true and correct copy of a Resolution passed at a Regular Meeting of the Board of Education of the Oakland Unified School District held on April 28, 2021.

OAKLAND UNIFIED SCHOOL DISTRICT



Shanthi Gonzales
President, Board of Education



Kyla Johnson-Trammell
Superintendent and Secretary, Board of Education

EXHIBIT A

ADDENDUM A TO AMENDMENT NO. 3 TO THE FACILITIES LEASE

INCREMENT 4A GUARANTEED MAXIMUM PRICE

319-427/6055463.1

Exhibit "A"

OUSD Fremont High School - Increment #4A

RS - Adjustments from 3/23 in person review

DSA Submittal Set - GMP

Owner: Oakland Unified School District
Architect: LCA Architects
Start Date: April 2021
Duration: Increment #4A (9 months)

Line Item Description	Increment #5 GMP 3/24/2021 TOTAL	LBE	SLBE	SUB	Notes / Adjustments	AED	GMP AMENDMENT TO BOARD (DELTA FROM CO)
02-4000 Site Clearing, Demolition, and Abatement	\$431,921	\$365,804	\$66,117	D-Line (LBE)		\$280,000	\$151,921
03-3100 Concrete, Rebar, Micropiles, Dewatering	\$369,889	\$57,059	\$41,319	Berkeley Concrete / CFJV		\$250,000	\$119,889
03-4900 Glass Fiber Reinforced Concrete	\$0	\$0	\$0	No Scope			
05-1000 Structural Steel & Misc. Metals	\$176,087	\$31,080	\$22,506	Ahlborn Steel		\$125,000	\$51,087
06-1010 Rough Carpentry	\$126,242	\$73,221	\$53,022	Cahill / Focon		\$0	\$126,242
06-2000 Finish Carpentry	\$105,729	\$20,946	\$15,168	BK Mill	Added \$20k allow for casework, added cost to demo existing book cas	\$0	\$105,729
07-2100 Insulation and Firestopping	\$10,604	\$3,981	\$2,883	Accurate Firestop		\$0	\$10,604
07-5000 Roofing and Waterproofing	\$85,759	\$15,367	\$11,128	Alcal	Added \$30k roof repair allow	\$0	\$85,759
07-6000 Sheet Metal, Flashing, Louvers and Exp Jts	\$164,455	\$45,624	\$33,038	Bay City Mechanical		\$16,446	\$148,010
07-9000 Sealants and Caulking	\$48,320	\$28,026	\$20,294	Cahill / Focon		\$0	\$48,320
08-1000 Doors, Frames and Hardware	\$31,653	\$3,850	\$2,788	RT Western		\$0	\$31,653
08-3600 Overhead Folding Doors	\$0	\$0	\$0	No Scope			
08-4000 Windows, Storefronts, Glazing and Skylights	\$462,548	\$58,607	\$403,940	MAZ Glazing (SLBE)		\$351,000	\$111,548
09-2200 Metal Stud Framing, Drywall and Fireproofing	\$232,011	\$82,906	\$133,888	Innovative Drywall (SLBE)	Added scope for plaster patch at arched windows	\$0	\$232,011
09-2400 Exterior Plaster	\$296,692	\$51,533	\$249,990	Hartley (SLBE)	Added \$10k for zinc accessories, removed \$20k allow for out of seque	\$0	\$296,692
09-3000 Tile and Stone	\$58,068	\$9,002	\$6,519	California Tile Installers		\$0	\$58,068
09-5000 Acoustical Ceilings	\$68,904	\$14,702	\$11,424	SF Interiors		\$0	\$68,904
09-6400 Flooring - Carpet, Resilient, Wood	\$55,553	\$12,242	\$8,865	Madsen		\$0	\$55,553
09-6600 Terrazzo Flooring	\$0	\$0	\$0	No Scope			
09-9000 Painting	\$92,344	\$15,860	\$76,485	D&B Painting (SLBE)		\$0	\$92,344
10-0010 Misc. Specialties and Equipment	\$0	\$0	\$0	No Scope			
10-1400 Signage	\$8,588	\$2,170	\$1,571	Priority Architectural Graphics		\$0	\$8,588
10-2800 Toilet and Bath Accessories	\$0	\$0	\$0	No Scope			
11-4000 Food Service Equipment	\$0	\$0	\$0	No Scope			
11-6100 AV, Theater and Stage Equipment	\$0	\$0	\$0	No Scope			
11-6500 Sports Equipment	\$0	\$0	\$0	No Scope			
12-2000 Window Treatments	\$0	\$0	\$0	No Scope			
21-0010 Fire Sprinklers	\$0	\$0	\$0	No Scope			
22-0010 Plumbing	\$0	\$0	\$0	No Scope			
23-0010 HVAC	\$108,077	\$13,902	\$10,067	N.V. Heathorn		\$42,000	\$66,077
26-0010 Electrical, Telephone, Data, and AV	\$416,552	\$61,666	\$349,887	Tulum (SLBE)	Added \$3.5k for title 24 testing	\$150,000	\$266,552
31-0010 Earthwork	\$0	\$0	\$0	No Scope			
32-1000 Asphalt Paving and Striping	\$0	\$0	\$0	No Scope			
32-1600 Site Concrete	\$0	\$0	\$0	In 03-3100			
32-8000 Landscape, Irrigation and Site Furnishings	\$0	\$0	\$0	No Scope			
33-0010 Site Utilities	\$0	\$0	\$0	No scope			
01-5450 Scaffold	\$72,014	\$21,320	\$15,439	NorCal Scaffolding		\$27,704	\$44,310
01-5640 Site Security	\$153,987	\$7,027	\$146,960	Elite Security (SLBE)		\$0	\$153,987
01-7423 Final Cleaning	\$29,462	\$6,471	\$4,686	Bay Maintenance Enterprise		\$0	\$29,462
SUBTOTAL	\$3,605,459	\$1,002,366	\$1,687,984			\$1,242,150	\$2,363,310
General Conditions & General Requirements	\$988,455	\$573,304	\$415,151			\$129,088	\$859,367
Preconstruction	\$49,795	\$49,795				\$49,795	\$0
Oakland City Tax 0.18%	\$8,359	\$8,359				\$2,468	\$5,890
Builders Risk Insurance	\$7,500	\$7,500				\$7,500	\$0
Liability Insurance 1.40%	\$70,405	\$70,405				\$20,034	\$50,371
Contractors Fee 5.00%	\$238,069	\$138,080	\$99,989			\$72,552	\$165,517
SUBTOTAL	\$4,968,041	\$1,849,808	\$2,203,124			\$1,523,586	\$3,444,455
Developer Contingency 2.00%	\$0	\$0		\$648,311 remaining in Dev. Contingency			\$0
Overtime / Hold Allowance / Property Watch 0.50%	\$0	\$0					\$0
District Allowance 5.00%	\$100,000	\$0		\$1,370,904 remaining in District Allow.			\$100,000
G.C. Bond 0.62%	\$31,422	\$31,422				\$9,446	\$21,976
TOTAL	\$5,099,463	37.63%	44.07%			\$1,533,033	\$3,566,430
LEASE INTEREST	\$2,550						\$2,550
GRAND TOTAL	\$5,102,013						\$3,568,980

General Conditions

VP Code	ITEM / DESCRIPTION	QTY	UNIT	M&E \$/UNIT	M & E	LABOR \$/UNIT	LABOR	TOTAL	REMARKS
PROJECT STAFFING									
Site Supervision									
01-3110	Field Superintendent	39	wks	0.00	0	8,400.00	327,348	327,348	
01-3120	Senior Superintendent	0	wks	0.00	0	0.00	0	0	In Insurance Rate
Project Management									
01-3130	President / VP - Nate K.	9	mos	0.00	0	3,000.00	27,000	27,000	12 hours/month
01-3131	Principle (FOCON) - Jabari H.	9	mos	0.00	0	3,000.00	27,000	27,000	12 hours/month
01-3140	Senior Project Manager - Nick M.	9	mos	0.00	0	7,577.50	68,198	68,198	1/4 Time
01-3150	Project Manager - Sabina N.	10	mos	0.00	0	19,918.00	199,180	199,180	Full Time
01-3160	Assist Project Manager (FOCON) - John L.	9	mos	0.00	0	18,186.00	163,674	163,674	Full Time
01-3170	Project Engineer	0	mos	0.00	0	14,722.00	0	0	Not Required
01-3191	BIM / Revit Technician	0	mos	0.00	0	0.00	0	0	Not Required
01-3184	Admin / Labor Compliance (FOCON) (Y. Gordon)	10	mos	0.00	0	6,191.90	61,919	61,919	4 hours/week
TOTAL PROJECT STAFFING					0		874,319	874,319	
FIELD OFFICES & SHEDS									
01-5213	Field Office & Shed Rental - Cahill	0	mos	1,000.00	0	0.00	0	0	Using existng office space
01-5213	Furniture / Office Equip	1	ls	2,500.00	2,500	0.00	0	2,500	
01-5214	Field Offices & Shed Delivery	0	trips	1,000.00	0	0.00	0	0	
01-5214	Connect Trailer Utilities - Phone, Power, Water	0	ls	2,500.00	0	0.00	0	0	Temp site utilities
01-5221	Telephone & Mobile Phones	9	mos	650.00	5,850	0.00	0	5,850	
01-5222	Drinking Water	9	mos	250.00	2,250	0.00	0	2,250	
01-5222	Office Supplies	9	mos	250.00	2,250	0.00	0	2,250	
01-5223	Copier / Printer - Incl Ink & Paper	9	mos	300.00	2,700	0.00	0	2,700	
01-5222	Computers & IT - Equipment	1	ls	5,000.00	5,000	0.00	0	5,000	
01-5800	Project Sign	1	ea	400.00	400	0.00	0	400	
01-9920	Security Containers	9	mos	500.00	4,500	0.00	0	4,500	
TOTAL FIELD OFFICES & SHEDS					25,450		0	25,450	
GENERAL EXPENSES									
Agency Fees									
01-4100	Building Permit	0	ls	0.00	0	0.00	0	0	By Owner
01-4110	CAL/OSHA Permit	1	ls	250.00	250	0.00	0	250	
01-4130	Street Closure / Special Traffic Permits	1	ls	5,000.00	5,000	0.00	0	5,000	
01-0080	Bonds for Street Excavations	1	ls	0.00	0	0.00	0	0	
Miscellaneous Items									
01-5224	Messenger Delivery Service / Postage	39	wks	50.00	1,949	0.00	0	1,949	

General Conditions

VP Code	ITEM / DESCRIPTION	QTY	UNIT	M&E \$/UNIT	M & E	LABOR \$/UNIT	LABOR	TOTAL	REMARKS	
01-5231	Travel, incl. Mileage, Bridge Toll	9	mos	800.00	7,200	0.00	0	7,200	For PM's / PE's	
01-5232	Parking (for General Conditions only)	0	mos	0.00	0	0.00	0	0		
01-5240	Print Drawings / Blueprints	9	mos	500.00	4,500	0.00	0	4,500		
01-5241	Draft As-Builts	1	ls	4,000.00	4,000	0.00	0	4,000		
01-5240	Plan Grid Fees	9	mos	375.00	3,375	0.00	0	3,375		
01-319x	Final Audit - Accounting Time	0	ls	0.00	0	0.00	0	0		Assume not Required
01-5250	Other Misc. General Expenses	9	mos	1,500.00	13,500	0.00	0	13,500		
General Requirements										
01-5219	Chemical Toilets / Wash Stations	9	mos	1,500.00	13,500	0.00	0	13,500		
01-5600	Perimeter Fences & Gates	125	lf	35.00	4,375	0.00	0	4,375		
01-7410	Debris Boxes	39	wks	450.00	17,537	0.00	0	17,537		
01-3500	On Site Safety Laborer / Covid Compliance	9	mos	1,000.00	9,000	0.00	0	9,000		
01-9920	Small Tools & Equipment	9	mos	500.00	4,500	0.00	0	4,500		
TOTAL GENERAL EXPENSES					88,686		0	88,686		
GRAND TOTAL GENERAL CONDITIONS								988,455		

**ADDENDUM A TO AMENDMENT NO. 3 TO FACILITIES LEASE
BY AND BETWEEN
OAKLAND UNIFIED SCHOOL DISTRICT
AND CAHILL/FOCON JOINT VENTURE**

RECITALS

WHEREAS, on or about September 27, 2017, the Oakland Unified School District (“District”) and Cahill/Focon Joint Venture (“Cahill”) entered into a Site Lease wherein the District leased the Site, as defined in Exhibits A and B to the Site Lease, to Cahill in order for it to perform the work necessary for the Fremont High School New Construction Project (“Project”) on the Site and to lease it back as more fully described in the Facilities Lease (“Site Lease”);

WHEREAS, on or about September 27, 2017, the District and Cahill entered into a Facilities Lease for the Project, which is attached and fully incorporated into the Site Lease (“Facilities Lease”);

WHEREAS, on or about February 15, 2018 the District’s Board of Education (“Board”) approved the Guaranteed Maximum Price (“GMP”) for Increment 1 of the Project in the amount of \$7,093,095 and approved Amendment No. 1 to the Facilities Lease to incorporate the Increment 1 GMP;

WHEREAS, on or about June 27, 2018, the Board approved the GMP for Increment 2 of the Project in the amount of \$18,339,992 and approved Amendment No. 2 to the Facilities Lease to incorporate the Increment 2 GMP;

WHEREAS, on or about January 9, 2019, the Board approved the GMP for Increments 3 and 4 of the Project in the amount of \$69,868,139 and approved Amendment No. 3 to the Facilities Lease to incorporate the Increment 3 and 4 GMP;

WHEREAS, the District seeks to perform necessary improvements at the Site, which includes the modernization and waterproofing of the library facility at the Site in order to continue performing work on and achieve completion of the Project, identified as Increment 4A; and

WHEREAS, the District further seeks Board approval to enter into Addendum A to Amendment No. 3 to the Facilities Lease (“Addendum A”) to incorporate the Increment 4A GMP.

NOW, THEREFORE, in consideration of the promises and of the mutual agreements and covenants contained herein, and other valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto do hereby agree as follows:

**INCREMENT 4A GUARANTEED MAXIMUM PRICE,
CONTINGENCY, FINAL SCHEDULE MILESTONES AND EXCLUSIONS**

A. Incorporation of Recitals; Definitions. The foregoing provisions of the Recitals are true and correct and are incorporated into this Addendum A to Amendment No. 3 to the

Facilities Lease by this reference. Any defined terms not defined herein will have the definition meaning given those terms in the Facilities Lease.

- B.** Increment 4A: On April 28, 2021, the Oakland Unified School District’s Board of Education approved the Guaranteed Maximum for the Increment 4A work to be performed and completed as part of the Fremont High School New Construction Project. The Increment 4A GMP is \$3,568.980. The supporting information for the GMP is listed below and incorporated herein. The District and Cahill (collectively referred to as the “Parties”) hereby amend the Facilities Lease and in accordance with this Addendum A to Amendment No. 3 to the Facilities Lease in order to add and incorporate therein the Increment 4A GMP.
- C.** Increment 4A Contract Documents: The Drawings Index and Specifications, or List of Contract Documents, including but not limited to the Qualifications, Assumptions & Exclusions for the Increment 4A scope of work to be performed for the Project is attached hereto as **Exhibit “A”** and incorporated herein. All of the Contract Documents referenced and listed in Exhibit “A” in their entirety are incorporated into the Facilities Lease.
- D.** Increment 4A Guaranteed Maximum Price and Project Schedule: The Increment 4A GMP in the amount of \$3,568.980 is attached hereto as **Exhibit “B”** and incorporated herein. The Increment 4A Project schedule is also attached hereto as **Exhibit “C”** and incorporated herein.
- E.** Authority. The District and Cahill each represents and warrants that the individual signing this Addendum A on behalf of such party is duly authorized to execute and deliver this Addendum A on behalf of such party, and that this Addendum A will be binding upon said party upon mutual execution and delivery thereof.
- F.** Governing Laws. This Addendum A is exclusively governed by the laws of the State of California, without regard to its conflict of law principles.
- G.** No Further Modifications. Except as specifically modified herein this Addendum A, the Facilities Lease remains unmodified and in full force and effect. In the event of any inconsistency between the provisions of the Facilities Lease and this Addendum A, the provisions of this Addendum A shall govern and control.
- H.** Counterparts. This Addendum A may be executed in counterparts, each of which shall be deemed an original, and such counterparts shall together be deemed to constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties hereto have executed Addendum A to Amendment No. 3 to the Facilities Lease by their authorized officers as of the dates so indicated below.

DISTRICT:

OAKLAND UNIFIED SCHOOL DISTRICT,

a school district organized and existing under the laws of the State of California

By: Mark Williams

Name: Mark Williams

Its: Counsel

Date: 04/02/21

LESSEE:

CAHILL/FOCON JOINT VENTURE

By: 

Name: Nathan Kaufman

Its: Vice President

Date: 3/29/21

EXHIBIT “A”

LIST OF CONTRACT DOCUMENTS

Project Manual: Dated 12/17/2020
Construction Manual: Dated 12/17/2020
Construction Drawings: SEE SHEET INDEX BELOW

DSA Date Stamped: Dated 12/15/2020

SHEET INDEX:

[Include Sheet Index for Increment 4A Scope of Work]

SPECIFICATION TABLE OF CONTENTS:

[Cahill/Focon Specification Table of Contents for Increment 4A Scope of Work]

[Cahill/Focon Qualifications, Assumptions & Exclusions for the Increment 4A]

EXHIBIT “A”

LIST OF CONTRACT DOCUMENTS

Project Manual: Dated 12/17/2020
Construction Manual: Dated 12/17/2020
Construction Drawings: SEE SHEET INDEX BELOW

DSA Date Stamped: Dated 12/15/2020

SHEET INDEX:

[Include Sheet Index for Increment 4A Scope of Work]

SPECIFICATION TABLE OF CONTENTS:

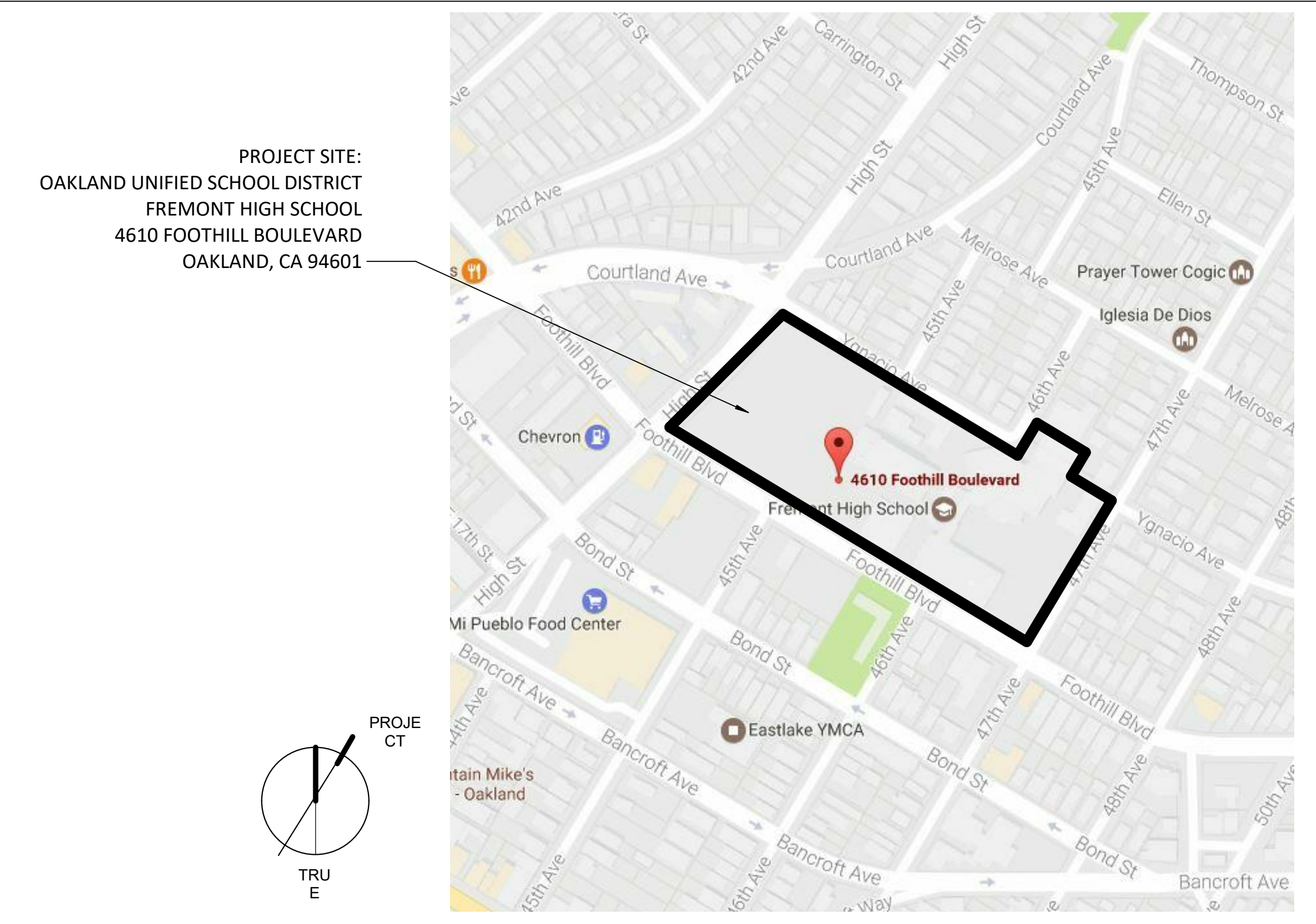
[Cahill/Focon Specification Table of Contents for Increment 4A Scope of Work]

[Cahill/Focon Qualifications, Assumptions & Exclusions for the Increment 4A]

GENERAL NOTES

1. DSA-APPROVED PLANS AND SPECIFICATIONS: THE CONTRACTOR SHALL PERFORM ALL WORK IN ACCORDANCE WITH ALL OF THE DSA-APPROVED PLANS AND SPECIFICATIONS. THE DSA-APPROVED PLANS AND SPECIFICATIONS SHALL NOT BE CHANGED OR MODIFIED WITHOUT THE APPROVAL OF THE BUILDING OFFICIAL PER SECTION 106.4 OF THE CALIFORNIA BUILDING CODE AS AMENDED.
2. SPECIFICATIONS: THE SPECIFICATIONS ARE A VITAL PART OF THESE CONTRACT DOCUMENTS, THEY ARE FOUND IN THE BOUND PROJECT MANUAL. THE CONTRACTOR AND THEIR PERSONNEL SHALL BECOME INTIMATELY FAMILIAR WITH THE SPECIFICATIONS PRIOR TO BIDDING THE PROJECT AND STARTING ANY CONSTRUCTION.
3. DIMENSIONS: DIMENSIONS SHALL GOVERN ON WORKING DRAWINGS. DO NOT SCALE DRAWINGS
4. OF THE SAME CHARACTER: IN THE EVENT CERTAIN FEATURES OF THE CONSTRUCTION ARE NOT FULLY SHOWN ON THE DRAWINGS OR CALLED FOR IN THE NOTES OR SPECIFICATIONS, THEN THEIR CONSTRUCTION SHALL BE OF THE SAME CHARACTER AS FOR SIMILAR CONDITIONS THAT ARE SHOWN OR CALLED FOR.
5. CONFLICTS BETWEEN DRAWINGS & SPECIFICATIONS: SHOULD CONFLICTS OCCUR BETWEEN THE DRAWINGS AND SPECIFICATIONS, DRAWINGS SHALL GOVERN IN MATTERS OF DIMENSION OR QUANTITY; SPECIFICATIONS SHALL GOVERN IN MATTERS OF MATERIALS OR FINISHES.
6. MOST EXPENSIVE REQUIREMENT: IN CASE OF DISCREPANCIES OR CONFLICTS IN INFORMATION OR REQUIREMENTS WITHIN THE DRAWINGS, WITHIN THE SPECIFICATIONS, OR BETWEEN THE DRAWINGS AND THE SPECIFICATIONS, THE MOST EXPENSIVE REQUIREMENT SHOWN OR SPECIFIED SHALL BE THE BASIS OF THE CONTRACT AND NOTED IN THE BID.
7. SUBCONTRACTORS & CONSTRUCTION DOCUMENTS
 - (A) THE GENERAL CONTRACTOR SHALL PROVIDE OR MAKE AVAILABLE A COMPLETE SET OF CONSTRUCTION DOCUMENTS (INCLUDING DRAWINGS AND SPECIFICATIONS) TO EVERY SUBCONTRACTOR BIDDING ANY PORTION OF THIS PROJECT.
 - (B) THE CONSTRUCTION DOCUMENTS SHALL NOT BE SEPARATED INTO DISCIPLINES (ARCHITECTURAL, MECHANICAL, ELECTRICAL, ETC.), FOR THE PURPOSES OF SUBCONTRACTOR BIDDING.
 - (C) THE GENERAL CONTRACTOR SHALL REQUIRE BIDDING SUBCONTRACTOR TO REVIEW THE ENTIRE SET OF CONSTRUCTION DOCUMENTS TO OBTAIN CLARITY ON THE COMPLETE SCOPE OF THEIR WORK, AND REFER TO CROSS DISCIPLINE DRAWINGS FOR FULL COORDINATION OF WORK WITH OTHER TRADES, AND TO BE AWARE OF ALL WORK WHICH DOES NOT APPEAR WITHIN THE PARTICULAR DISCIPLINE DRAWINGS FOR THE SUBCONTRACTOR TRADE.
 - (D) THE GENERAL CONTRACTOR SHALL INSURE THAT EACH SUBCONTRACTOR WORKING ON THE PROJECT MAINTAINS A FULL SET OF CONSTRUCTION DOCUMENTS THROUGH OUT THE CONSTRUCTION OF THE PROJECT.
8. PLANS AVAILABLE ON SITE
 - (A) DSA APPROVED PLANS SHALL BE KEPT IN A PLAN BOX IN THE FIELD OFFICE AND SHALL NOT BE MARKED ON OR MODIFIED IN ANY WAY.
 - (B) ALL CONSTRUCTION SETS SHALL BE KEPT UP TO DATE, AND REFLECT THE SAME INFORMATION AS THE GENERAL CONTRACTOR'S SET.
 - (C) THE CONTRACTOR SHALL ALSO MAINTAIN, IN GOOD CONDITION, ONE COMPLETE SET OF PLANS WITH ALL REVISIONS, ADDENDA, AND CHANGE ORDERS ON THE PREMISES AT ALL TIMES. THESE ARE TO BE UNDER THE CARE OF THE JOB SUPERINTENDENT.
9. REVIEW PLANS & EXISTING SITE CONDITIONS: THE CONTRACTOR SHALL THOROUGHLY REVIEW PLANS AND EXISTING SITE CONDITIONS AND NOTIFY ARCHITECT OF ANY DISCREPANCIES, ERRORS OR OMISSIONS PRIOR TO BID.
10. VERIFY ALL EXISTING CONDITIONS: PRIOR TO CONSTRUCTION AND GRADING, VERIFY ALL EXISTING CONDITIONS AND CONTACT UTILITY COMPANIES AND AFFECTED CITY AGENCIES. CONTACT "UNDERGROUND SERVICE ALERT" CONTRACTOR IS TO RETAIN SERVICES OF LICENSED SURVEYOR TO SURVEY SITE PRIOR TO START OF WORK, AND RETAIN SURVEYOR FOR THE DURATION OF THE PROJECT UNTIL SUBSTANTIAL COMPLETION.
11. CONTRACTOR'S RESPONSIBILITIES: NEITHER THE ARCHITECT, NOR THE ENGINEERS, NOR THE OWNER SHALL BE RESPONSIBLE FOR: CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OF CONTRACTOR, SAFETY PRECAUTIONS AND PROGRAMS OF CONTRACTOR, THE ACTS OR OMISSIONS OF CONTRACTOR, OR THE FAILURE OF CONTRACTOR TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
12. SAFETY: CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR SAFETY ON OR ABOUT THE CONSTRUCTION SITE IN ACCORDANCE WITH APPLICABLE LAWS AND CODE, AND SHALL OBSERVE SAFETY PROVISIONS OF THE LATEST MANUAL OF ACCIDENT PREVENTION PUBLISHED BY THE ASSOCIATION OF GENERAL CONTRACTORS OF AMERICA.
13. EXISTING UTILITIES & PROPERTY: IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL EXISTING UTILITIES, WHETHER SHOWN HEREIN OR NOT, AND TO PROTECT THEM FROM DAMAGE. THE CONTRACTOR SHALL BEAR ALL THE EXPENSE FOR REPAIR OR REPLACEMENT OF UTILITIES AND/OR OTHER PROPERTY DAMAGED BY OPERATIONS IN CONJUNCTION WITH THE EXECUTION OF WORK.
14. ERRORS, INCONSISTENCIES, OR OMISSIONS: THE CONTRACTOR SHALL REPORT TO THE ARCHITECT ANY ERRORS, INCONSISTENCIES, OR OMISSIONS HE MAY DISCOVER. THE CONTRACTOR IS RESPONSIBLE FOR CORRECTING ANY ERROR AFTER THE START OF CONSTRUCTION WHICH HAS NOT BEEN BROUGHT TO THE ATTENTION OF THE ARCHITECT. THE MEANS OF CORRECTING ANY ERROR SHALL BE FIRST APPROVED BY THE OWNER.
15. FIELD CONFIRMATION OF DISCREPANCIES: FIELD CONFIRMATION OF DISCREPANCIES SHALL BE RECORDED ON A REPRODUCIBLE DOCUMENT AND IMMEDIATELY TRANSMITTED TO ARCHITECT FOR PROJECT RECORD, COORDINATION, AND NECESSARY RESOLUTION PRIOR TO CONTINUING WORK.
16. MATERIAL & PRODUCT INSTALLATION: INSTALL ALL MATERIALS AND PRODUCTS IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND APPLICABLE IBC/O STANDARDS.
17. STRUCTURAL MEMBERS: NO STRUCTURAL MEMBERS SHALL BE CUT TO ACCEPT PIPES, VENTS, DUCTS, ETC., EXCEPT AS DETAILED OR SPECIFIED HEREIN OR AS APPROVED BY THE STRUCTURAL ENGINEER AND DSA IN WRITING.
18. EXTERIOR OPENINGS: EXTERIOR OPENINGS IN CONSTRUCTION SITE PERIMETER SHALL COMPLY WITH ALL SECURITY REQUIREMENTS AS OUTLINED IN ALL LOCAL BUILDING CODES AND/OR ORDINANCES.
19. SECURING THE SITE: CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLETE SECURITY OF THE SITE WHILE THE JOB IS IN PROGRESS AND UNTIL THE JOB IS COMPLETE.
20. MAINTAINING THE SITE: CONTRACTOR SHALL MAINTAIN THE SITE IN A CLEAN AND ORDERLY MANNER. ALL DEBRIS SHALL BE REMOVED FROM PREMISES.
21. A COMPLETELY FINISHED PROJECT: THE CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING ALL WORK REQUIRED FOR A COMPLETELY FINISHED PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK FURNISHED BY SUBCONTRACTORS.
22. IN ACCORDANCE WITH TITLE 24, C.C.R.: THE INTENT OF THE DRAWINGS AND SPECIFICATIONS IS FOR ALL CONSTRUCTION TO BE IN ACCORDANCE WITH TITLE 24, C.C.R. SHOULD ANY CONDITIONS DEVELOP NOT COVERED BY THE CONTRACT DOCUMENTS WHEREIN THE FINISHED WORK WILL NOT COMPLY WITH THE SAID TITLE 24, C.C.R. A CONSTRUCTION CHANGE DOCUMENT DETAILING AND SPECIFYING THE REQUIRED WORK SHALL BE SUBMITTED TO AND APPROVED BY D.S.A. BEFORE PROCEEDING WITH THE WORK.
23. SUBMITTALS: ALL SUBMITTALS & SHOP DRAWINGS SHALL BE REVIEWED, STAMPED, & APPROVED BY THE GENERAL CONTRACTOR AS MEETING THE INTENT OF THE CONTRACT DOCUMENTS PRIOR TO ISSUING TO THE ARCHITECT. NO DOCUMENTS FROM SUBCONTRACTORS SHALL BE SUBMITTED DIRECTLY TO THE ARCHITECT OR TO THE ARCHITECT'S CONSULTANTS.
24. DEFERRED APPROVALS: DEFERRED APPROVAL ITEMS SHALL BE SUBMITTED BY CONTRACTOR TO DSA FOR APPROVAL AFTER REVIEW FOR GENERAL CONFORMANCE BY THE ARCHITECT AND STRUCTURAL ENGINEER. SUBMITTAL TO INCLUDE REQUIRED NUMBER OF SEALED AND SIGNED PLANS, SUPPORTING CALCULATIONS, SHOP DRAWINGS ETC. TO ADEQUATELY DEFINE THE PRODUCT.
25. PROTECT EXISTING PROPERTY DURING CONSTRUCTION: CONTRACTOR TO BE RESPONSIBLE TO REPAIR OR REPLACE, WITHOUT ADDITIONAL CHARGE TO THE OWNER, ANY EXISTING WORK DAMAGED DURING THE COURSE OF CONSTRUCTION.
26. FURNISHED BY OTHERS: UNLESS ITEMS OF MATERIAL, EQUIPMENT OR WORK SPECIFICALLY NOTED TO BE PROVIDED OR FURNISHED BY OTHER, THEY SHALL BE PROVIDED UNDER THIS CONTRACT.
27. ALL N.I.C. ITEMS ARE NOT PART OF DSA APPROVAL.

LOCATION MAP



STATEMENT OF GENERAL CONFORMANCE

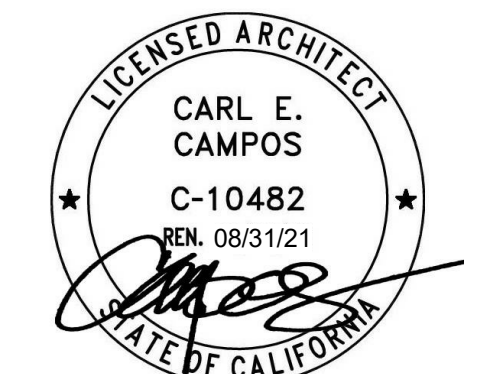
THE DRAWINGS OR SHEETS LISTED ON THE SHEET INDEX HAVE BEEN PREPARED BY OTHER DESIGN PROFESSIONALS OR CONSULTANTS WHO ARE LICENSED AND/OR AUTHORIZED TO PREPARE SUCH DRAWINGS IN THIS STATE. THEY HAVE BEEN EXAMINED BY ME FOR:

- 1) DESIGN INTENT AND APPEARS TO MEET THE APPROPRIATE REQUIREMENTS OF TITLE 24, CALIFORNIA CODE OF REGULATIONS AND THE PROJECT SPECIFICATIONS PREPARED BY ME.
- 2) COORDINATION WITH MY PLANS AND SPECIFICATIONS AND IS ACCEPTABLE FOR INCORPORATION INTO THE CONSTRUCTION OF THIS PROJECT.

THIS STATEMENT OF GENERAL CONFORMANCE "SHALL NOT BE CONSTRUED AS RELIEVING ME OF MY RIGHTS, DUTIES, AND RESPONSIBILITIES" UNDER SECTIONS 17302 AND 81138 OF THE EDUCATION CODE AND SECTIONS 4-336, 4-341 AND 4-344 OF TITLE 24, PART 1 (TITLE 24, PART 1, SECTION 4-317 (B))

ARCHITECT

LCA ARCHITECTS *
1570 BROADWAY, SUITE 800
OAKLAND, CA 94612
PHONE: (510) 272-1060
FAX: (510) 272-1066



I FIND THAT ALL STRUCTURAL, MECHANICAL, ELECTRICAL AND FIRE ALARM DRAWINGS OR SHEETS LISTED ON THE SHEET INDEX ARE IN GENERAL CONFORMANCE WITH THE PROJECT DESIGN AND HAVE BEEN COORDINATED WITH THE PROJECT PLANS AND SPECIFICATIONS.

ARCHITECT DESIGNATED TO BE IN GENERAL RESPONSIBLE CHARGE:
CARL E. CAMPOS | LICENSE NO. C10482 | EXP. 8/31/21

PROJECT INFORMATION

CONSTRUCTION TYPE:	TYPE III
STORIES:	2 STORY WITH BASEMENT
OCCUPANCY TYPE:	A-3 AND B
SPRINKLERED:	BASEMENT SPRINKLERED, FIRST AND SECOND FLOOR NON-SPRINKLERED
AREA:	BASEMENT 8,140 SF 1ST FLOOR 8,140 SF 2ND FLOOR 8,140 SF

DSA REQUIREMENTS

- NOTE: ALL SECTION NUMBERS REFER TO GROUP 1, CHAPTER 4, PART I, TITLE 24, C.C.R.
1. SECT. 4-338: ADDENDA & CONSTRUCTION CHANGE DOCUMENT
 2. SECT. 4-333 (B) 7 SECT. 4-342: DSA-APPROVED INSPECTOR & CONTINUOUS INSPECTION OF WORK. (INSPECTOR EMPLOYED DIRECTLY BY OWNER)
 3. SECT. 4-335: TESTS & TESTING LABORATORY (OWNER SHALL PAY THE TESTING LABORATORY)
 4. SECT. 4-333(C): SPECIAL INSPECTION
 5. SECT. 4-336 & SECT. 4-343 (C) CONTRACTOR SUBMIT VERIFIED REPORTS
 6. ADMINISTRATION OF CONSTRUCTION PER PART I, TITLE 24, C.C.R.:
 - A. SECT. 4-338(A) & SECT. 4-341: DUTIES OF ARCHITECT, STRUCTURAL ENGINEER OR PROFESSIONAL ENGINEER
 - B. SECT. 4-343: DUTIES OF CONTRACTOR
 - C. SECT. 4-336: VERIFIED REPORTS
 7. GOVERNING CODES: TITLE 24, C.C.R.
 8. A COPY OF TITLE 24, PART 1 TO 5, SHALL BE KEPT AND AVAILABLE IN THE FIELD DURING CONSTRUCTION
 9. SECT. 4-331: DSA SHALL BE NOTIFIED ON START OF CONSTRUCTION.
 10. SECT. 4-334: SUPERVISION BY DSA.
 11. THE INTENT OF THESE DRAWINGS & SPECIFICATIONS IS THAT THE WORK OF THE ALTERATION, REHABILITATION OR RECONSTRUCTION IS TO IN ACCORDANCE WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS. SHOULD ANY EXISTING CONDITIONS SUCH AS DETERIORATION OR NON-COMPLYING CONSTRUCTION BE DISCOVERED WHICH IS NOT COVERED BY THE CONTRACT DOCUMENTS WHEREIN THE FINISHED WORK WILL NOT COMPLY WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS, A CONSTRUCTION CHANGE DOCUMENT, OR A SEPARATE SET OF PLANS AND SPECIFICATIONS, DETAILING & SPECIFYING THE REQUIRED WORK SHALL BE SUBMITTED TO & APPROVED BY DSA BEFORE PROCEEDING WITH THE WORK.
 12. DSA IS NOT SUBJECT TO ARBITRATION.
 13. FABRICATION AND INSTALLATION OF DEFERRED SUBMITTAL ITEMS SHALL NOT BE STARTED UNTIL CONTRACTOR'S DRAWINGS, SPECIFICATIONS, AND ENGINEERING CALCULATIONS FOR ACTUAL SYSTEM TO BE INSTALLED HAVE BEEN ACCEPTED AND SIGNED BY THE ARCHITECT OR STRUCTURAL ENGINEER AND APPROVED BY THE DSA.

REFERENCE STANDARDS

PARTIAL LIST:

CODE DESCRIPTION EDITION

NFPA 10	PORTABLE FIRE EXTINGUISHERS	2019
NFPA 17	DRY CHEMICAL EXTINGUISHING SYSTEMS	2019
NFPA 17-A	WET CHEMICAL SYSTEMS	2019
NFPA 72	NATIONAL FIRE ALARM CODE + CALIF AMENDMENTS	2019
NFPA 80	FIRE DOORS AND OTHER OPENING PROTECTIVES	2019
NFPA 253	CRITICAL RADIANT FLUX OF FLOOR COVERING SYSTEMS,	2019
NFPA 2001	CLEAN AGENT FIRE EXTINGUISHING SYSTEMS	2019

REFERENCE CODE SECTION FOR NFPA STANDARDS - 2019 CBC (SFM) CHAPTER 35 & 2018 CFC CHAPTER 47

DEFERRED APPROVALS

1. GFRC TRIM - (NOT USED)
2. GLAZING SYSTEMS OVER 10' SPAN AS WELL AS LESS THAN OR EQUAL TO 10' SPAN (STOREFRONT & KALWALL)

APPLICABLE CODES

- ALL CONSTRUCTION SHALL COMPLY WITH THE FOLLOWING CODES:
1. 2019 CALIFORNIA (CAC) ADMINISTRATIVE CODE TITLE 24 CALIF. CODE OF REGULATIONS (C.C.R.), PART 1
 2. 2019 CAL BUILDING CODE (CBC), TITLE 24 C.C.R., PART 2 (2018 INTERNATIONAL BUILDING CODE VOL. 1 & 2 AND 2019 CAL AMENDMENTS)
 3. 2019 CAL ELECTRICAL CODE (CEC), TITLE 24 C.C.R., PART 3 (2017 NATIONAL ELECTRIC CODE AND 2019 CAL AMENDMENTS.)
 4. 2019 CAL MECHANICAL CODE (CMC), TITLE 24 C.C.R., PART 4 (2018 UNIFORM MECHANICAL CODE AND 2019 CAL AMENDMENTS)
 5. 2019 CAL PLUMBING CODE (CPC), TITLE 24 C.C.R., PART 5 (2018 UNIFORM PLUMBING CODE AND 2019 CAL AMENDMENTS)
 6. 2019 CAL ENERGY CODE, CCR, TITLE 24 C.C.R., PART 6
 7. 2019 CAL FIRE CODE (CFC), TITLE 24, PART 9 (2018 INTERNATIONAL FIRE CODE AND 2019 CAL AMENDMENTS)
 8. 2019 CAL GREEN BUILDING STANDARDS CODE, PART 11
 9. 2019 CAL REFERENCED STANDARDS, TITLE 24 C.C.R., PART 12
 10. TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS
 11. ACI-318-14, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE

THIS LIST IS NOT INTENDED TO BE ALL INCLUSIVE, OR LIST ALL APPLICABLE CODES. THE CONTRACTOR, SUBCONTRACTORS AND ALL MANUFACTURER'S ARE REQUIRED TO FOLLOW ALL APPLICABLE CODES INCLUDING FEDERAL, STATE, MUNICIPAL, AND ALL REGULATORY AGENCIES.

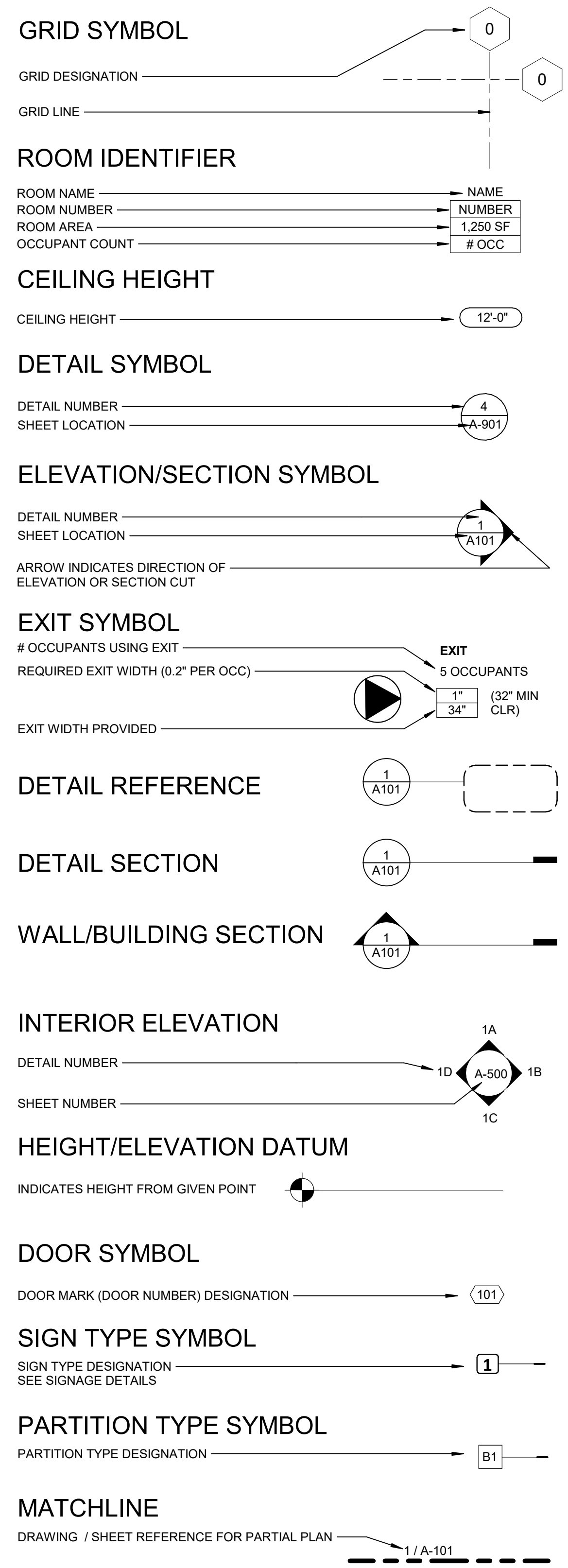
SCOPE OF WORK

- THIS PROPOSED SCOPE OF WORK HAS THREE MAIN COMPONENTS:
- 1) RENOVATE THE EXTERIOR FAÇADE ON WEST AND SOUTH ELEVATIONS WHERE EXISTING CLADDING IS FAILING AS WELL AS REPLACING THE WINDOWS ON THESE ELEVATIONS.
 - 2) MODIFY CURTAIN WALL ON NORTH ELEVATION TO ADD DOUBLE-DOOR AND EXPAND THE WALL OPENING IN THE CONCRETE WALL BETWEEN THE DOORS AND THE RECEPTION AREA.
 - 3) PERFORM A T.I. UPGRADE TO THE OFFICE SPACE ON THE MAIN FLOOR CONSISTING MOSTLY OF REPLACING THE FLOOR FINISH, CEILING GRID/TILE, AND LIGHTING. MECHANICAL SYSTEM IS NOT INTENDED TO BE REPLACED AND NO WORK OTHER THAN THAT ASSOCIATED WITH REPLACING THE WINDOWS WILL OCCUR IN EITHER THE BASEMENT OR 2ND FLOOR.
- 4) EXISTING FIRE ALARM SYSTEM TO REMAIN. DEVICES TO BE RE-LABELLED PER DISTRICT STANDARDS. REMOVE AND REINSTALL EXISTING NOTIFICATION DEVICES TO NEW LOCATION AS SHOWN ON PLANS. // NEW NOTIFICATION DEVICES PER PLANS.

ALTERNATES

N/A

SYMBOLS



OAKLAND UNIFIED SCHOOL DISTRICT
FREMONT HIGH SCHOOL
4610 FOOTHILL BOULEVARD,
OAKLAND, CALIFORNIA 94601
MODERNIZATION & NEW CONSTRUCTION

LCA PROJECT #: 14019
PTN: 61259-377
DSA FILE: 1-H8
DSA APPLICATION: 01-118855

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AS1.02	CAMPUS ENLARGED ACCESSIBLE PARKING & DETAILS (FOR REFERENCE ONLY)
AS1.03	ACCESSIBLE PARKING DETAILS (FOR REFERENCE ONLY)
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AD1.01	DEMO PLANS
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ELECTRICAL	
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E0.01	ELECTRICAL SCHEDULES
ED1.01	ELECTRICAL DEMO PLANS - LEVEL 1
E1.01	ELECTRICAL PLANS - LEVEL 1
E5.01	ELECTRICAL DETAILS
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E7.01	SINGLE LINE DIAGRAM
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FA0.01	FIRE ALARM TITLE SHEET
FA1.01	FIRE ALARM - BASEMENT AND LEVEL 1
FA1.02	FIRE ALARM - LEVEL 2
FA7.01	FIRE ALARM RISER DIAGRAM
4	
TOTAL SHEETS: 37	

ADDENDUM 01

January 15, 2021

THIS SPACE RESERVED FOR DSA APPROVAL STAMP



RESTRICTED ARCHITECTURAL DRAWINGS
THE INFORMATION, PLANS, DESIGN, NOTES AND ARRANGEMENTS SHOWN ON THIS DRAWING ARE CONFIDENTIAL AND MAY NOT BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE EXPRESSED WRITTEN PERMISSION OF LCA ARCHITECTS. DRAWINGS NOTED AS PRELIMINARY, SCHEMATIC AND/OR CONCEPT CONTAIN INFORMATION THAT IS CONCEPTUAL AND SUBJECT TO VERIFICATION AND/OR CHANGE. THE ARCHITECT MAKES NO GUARANTEE FOR ACCURACY OF CONCEPTUAL INFORMATION OR OF INFORMATION SUPPLIED BY OTHERS.

14019 OAKLAND UNIFIED SCHOOL DISTRICT
FREMONT HIGH SCHOOL - LIBRARY BUILDING RENOVATION
4610 FOOTHILL BOULEVARD
OAKLAND, CA 94601

THIS SPACE RESERVED FOR PROFESSIONAL SEAL



SCALE: 1/2" = 1'-0"
DATE: 01/18/2021

ISSUES:
4/06/2020 - DSA Submission
10/05/2020 - DSA Back-Check Submission
11/20/2020 - DSA Back-Check Submission
12/16/2020 - DSA Back-Check Submission

REVISIONS:
1. ADDENDUM 01 01/18/2021

COVER, SHEET INDEX & GENERAL NOTES

G0.0

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01 31 19	Project Meetings
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01 32 33	Photographic Documentation
01 33 00	Submittals
01 35 13	Site Standards
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06 40 23	Interior Architectural Woodwork
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DIVISION 07 – THERMAL AND MOISTURE PROTECTION

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07 21 00	Thermal Insulation
07 22 16	Roof Board Insulation [Not Used]
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07 27 00	Fluid Applied Weather Resistive Air & Moisture Barrier Membrane
07 62 00	Sheet Metal Flashing and Trim
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SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access Conditions and Requirements;
- B. Special Conditions.

1.02 SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of this Contract consists of the following:
Library Building Renovation

- 1) Renovate the exterior facade on west and south elevations where existing cladding is failing as well as replacing the windows on these elevations.
- 2) Modify curtain wall on north elevation to add double door and expand the wall opening in the concrete wall between the doors and reception area.
- 3) Perform a T.I. upgrade to the office space consisting of replacing flooring, ceiling tiles, lights and windows at basement level. New painting throughout.
- 4) Fire Alarm to remain, devices re-labeled per District standards. Remove and re-install existing notification devices to new locations as shown.

1.03 CONTRACTS

- A. Perform the Work under a single, fixed-price Contract.

1.04 WORK BY OTHERS

- A. Work on the Project that will be performed and completed prior to the start of the Work of this Contract:

- (1) Asbestos removal/abatement.
- (2) Lead paint removal/abatement.

- B. Work on the Project that will be performed by others concurrent with the Work of this Contract:

- (1) _____
- (2) _____

1.05 CODES, REGULATIONS, AND STANDARDS

- A. The codes, regulations, and standards adopted by the state and federal agencies having jurisdiction shall govern minimum requirements for this Project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.
- B. Codes, regulations, and standards shall be as published effective as of date of bid opening, unless otherwise specified or indicated.

1.06 PROJECT RECORD DOCUMENTS

- A. Contractor shall maintain on Site one set of the following record documents; Contractor shall record actual revisions to the Work:
 - (1) Contract Drawings.
 - (2) Specifications.
 - (3) Addenda.
 - (4) Change Orders and other modifications to the Contract.
 - (5) Reviewed shop drawings, product data, and samples.
 - (6) Field test records.
 - (7) Inspection certificates.
 - (8) Manufacturer's certificates.
- B. Contractor shall store Record Documents separate from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.
- C. Contractor shall record information concurrent with construction progress.
- D. Specifications: Contractor shall legibly mark and record at each product section of the Specifications the description of the actual product(s) installed, including the following:
 - (1) Manufacturer's name and product model and number.
 - (2) Product substitutions or alternates utilized.
 - (3) Changes made by Addenda and Change Orders and written directives.

1.07 EXAMINATION OF EXISTING CONDITIONS

- A. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site and of the streets or roads approaching the Site.
- B. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.
- C. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

1.08 CONTRACTOR'S USE OF PREMISES

- A. If unoccupied and only with District's prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.
- B. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor.
- C. Contractor shall not interfere with use of or access to occupied portions of the building(s) or adjacent property.
- D. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.
- E. No one other than those directly involved in the demolition and construction, or specifically designated by the District or the Architect shall be permitted in the areas of work during demolition and construction activities.
- F. The Contractor shall install the construction fence and maintain that it will be locked when not in use. Keys to this fencing will be provided to the District.

1.09 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing

installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.

- B. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

1.10 UTILITY SHUTDOWNS AND INTERRUPTIONS

- A. Contractor shall give the District a minimum of three (3) days written notice in advance of any need to shut off existing utility services or to effect equipment interruptions. The District will set exact time and duration for shutdown, and will assist Contractor with shutdown. Work required to re-establish utility services shall be performed by the Contractor.
- B. Contractor shall obtain District's written approval as indicated in the General Conditions in advance of deliveries of material or equipment or other activities that may conflict with District's use of the building(s) or adjacent facilities.

1.11 STRUCTURAL INTEGRITY

- A. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.
- B. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 25 13
PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. Instructions to Bidders;
- B. General Conditions, including, without limitation, Substitutions For Specified Items; and
- C. Special Conditions.

1.02 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT

- A. Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified may be reviewed subject to the provisions of the General Conditions.
- B. Wherever more than one manufacturer's product is specified, the first-named product is the basis for the design used in the work and the use of alternative-named manufacturers' products or substitutes may require modifications in that design. If such alternatives are proposed by Contractor and are approved by the District and/or the Architect, Contractor shall assume all costs required to make necessary revisions and modifications of the design resulting from the substitutions requested by the Contractor.
- C. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or approved equal," supporting data for the second product, if proposed by Contractor, shall be submitted in accordance with the requirements for substitutions. The District's Board has found and determined that certain item(s) shall be used on this Project based on the purpose(s) indicated pursuant to Public Contract Code section 3400(c). These findings, as well as the products and brand or trade names, have been identified in the Notice to Bidders.
- D. The Contractor will not be allowed to substitute specified items unless the request for substitution is submitted as follows:
 - (1) District must receive any notice of request for substitution of a specified item a minimum of ten (10) calendar days prior to bid opening.
 - (2) Within 35 days after the date of the Notice of Award, the Contractor shall submit data substantiating the request(s) for all substitution(s)

01 25 19 PRODUCT OPTIONS AND SUBSTITUTIONS

containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the technical Specifications. Insufficient information shall be grounds for rejection of substitution.

- E. If the District and/or Architect, in reviewing proposed substitute materials and equipment, require revisions or corrections to be made to previously accepted Shop Drawings and supplemental supporting data to be resubmitted, Contractor shall promptly do so. If any proposed substitution is judged by the District and/or Architect to be unacceptable, the specified material or equipment shall be provided.
- F. Samples may be required. Tests required by the District and/or Architect for the determination of quality and utility shall be made at the expense of Contractor, with acceptance of the test procedure first given by the District.
- G. In reviewing the supporting data submitted for substitutions, the District and/or Architect will use for purposes of comparison all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Contract Documents. If more than two (2) submissions of supporting data are required, the cost of reviewing the additional supporting data shall be borne by Contractor, and the District will deduct the costs from the Contract Price. The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute.
- H. The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit. In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.
- I. In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 25 13
PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. Instructions to Bidders;
- B. General Conditions, including, without limitation, Substitutions For Specified Items; and
- C. Special Conditions.

1.02 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT

- A. Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified may be reviewed subject to the provisions of the General Conditions.
- B. Wherever more than one manufacturer's product is specified, the first-named product is the basis for the design used in the work and the use of alternative-named manufacturers' products or substitutes may require modifications in that design. If such alternatives are proposed by Contractor and are approved by the District and/or the Architect, Contractor shall assume all costs required to make necessary revisions and modifications of the design resulting from the substitutions requested by the Contractor.
- C. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or approved equal," supporting data for the second product, if proposed by Contractor, shall be submitted in accordance with the requirements for substitutions. The District's Board has found and determined that certain item(s) shall be used on this Project based on the purpose(s) indicated pursuant to Public Contract Code section 3400(c). These findings, as well as the products and brand or trade names, have been identified in the Notice to Bidders.
- D. The Contractor will not be allowed to substitute specified items unless the request for substitution is submitted as follows:
 - (1) District must receive any notice of request for substitution of a specified item a minimum of ten (10) calendar days prior to bid opening.
 - (2) Within 35 days after the date of the Notice of Award, the Contractor shall submit data substantiating the request(s) for all substitution(s)

containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the technical Specifications. Insufficient information shall be grounds for rejection of substitution.

- E. If the District and/or Architect, in reviewing proposed substitute materials and equipment, require revisions or corrections to be made to previously accepted Shop Drawings and supplemental supporting data to be resubmitted, Contractor shall promptly do so. If any proposed substitution is judged by the District and/or Architect to be unacceptable, the specified material or equipment shall be provided.
- F. Samples may be required. Tests required by the District and/or Architect for the determination of quality and utility shall be made at the expense of Contractor, with acceptance of the test procedure first given by the District.
- G. In reviewing the supporting data submitted for substitutions, the District and/or Architect will use for purposes of comparison all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Contract Documents. If more than two (2) submissions of supporting data are required, the cost of reviewing the additional supporting data shall be borne by Contractor, and the District will deduct the costs from the Contract Price. The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute.
- H. The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit. In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.
- I. In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 26 00

CHANGES IN THE WORK

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE PROVISIONS IN THE AGREEMENT, GENERAL CONDITIONS, AND SPECIAL CONDITIONS, IF USED, RELATED TO CHANGES AND/OR REQUESTS FOR CHANGES.

END OF DOCUMENT

DOCUMENT 01 29 00

**APPLICATION FOR PAYMENT AND
CONDITIONAL AND UNCONDITIONAL WAIVER AND RELEASE FORMS**

**CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS IN THE GENERAL
CONDITIONS RELATED TO APPLICATIONS FOR PAYMENT AND/OR PAYMENTS.**

**01 29 00 APPLICATION FOR PAYMENT AND CONDITIONAL AND
UNCONDITIONAL WAIVER AND RELEASE FORMS**

118855 Library Façade Renovation
Fremont High School Modernization & New Construction
Oakland Unified School District | LCA #14019 | OAK 1437.00

DSA Backcheck (10/05/2020) | page 1 of 6

**CONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8132)**

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: \$ _____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:

Date(s) of waiver and release: _____

01 29 00 APPLICATION FOR PAYMENT AND CONDITIONAL AND UNCONDITIONAL WAIVER AND RELEASE FORMS

Amount(s) of unpaid progress payment(s): \$_____

- (4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

01 29 00 APPLICATION FOR PAYMENT AND CONDITIONAL AND UNCONDITIONAL WAIVER AND RELEASE FORMS

**UNCONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8134)**

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment: \$_____

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**CONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8136)**

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: \$ _____

Check Payable to: _____

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: \$ _____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**01 29 00 APPLICATION FOR PAYMENT AND CONDITIONAL AND
UNCONDITIONAL WAIVER AND RELEASE FORMS**

**UNCONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8138)**

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: \$ _____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

PROJECT MEETINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions; and
- B. Special Conditions.

1.02 PROGRESS MEETINGS:

- A. Contractor shall schedule and hold regular weekly progress meetings after a minimum of one week's prior written notice of the meeting date and time to all Invitees as indicated below.
- B. Location: Contractor's field office.
- C. The Contractor shall notify and invite the following entities ("Invitees"):
 - (1) District Representative.
 - (2) Contractor.
 - (3) Contractor's Project Manager.
 - (4) Contractor's Superintendent.
 - (5) Subcontractors, as appropriate to the agenda of the meeting.
 - (6) Suppliers, as appropriate to the agenda of the meeting.
 - (7) Construction Manager, if any.
 - (8) Architect
 - (9) Engineer(s), if any and as appropriate to the agenda of the meeting.
 - (10) Others, as appropriate to the agenda of the meeting.
- D. The District's and/or the Architect's Consultants will attend at their discretion, in response to the agenda.
- E. The District representative, the Construction Manager, and/or another District Agent shall take and distribute meeting notes to attendees and other

concerned parties. If exceptions are taken to anything in the meeting notes, those exceptions shall be stated in writing to the District within five (5) working days following District's distribution of the meeting notes.

1.03 PRE-INSTALLATION/PERFORMANCE MEETING:

- A. Contractor shall schedule a meeting prior to the start of each of the following portions of the Work: cutting and patching of plaster and roofing, and other weather-exposed and moisture-resistant products. Contractor shall invite all Invitees to this meeting, and others whose work may affect or be affected by the quality of the cutting and patching work.
- B. Contractor shall review in detail prior to this meeting, the manufacturer's requirements and specifications, applicable portions of the Contract Documents, Shop Drawings, and other submittals, and other related work. At this meeting, invitees shall review and resolve conflicts, incompatibilities, or inadequacies discovered or anticipated.
- C. Contractor shall review in detail Project conditions, schedule, requirements for performance, application, installation, and quality of completed Work, and protection of adjacent Work and property.
- D. Contractor shall review in detail means of protecting the completed Work during the remainder of the construction period.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

SCHEDULING OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Summary of Work; and
- D. Submittals.

1.02 SECTION INCLUDES

- A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.
 - (1) Development of schedule, cost and resource loading of the schedule, monthly payment requests, and project status reporting requirements of the Contract shall employ computerized Critical Path Method (“CPM”) scheduling (“CPM Schedule”).
 - (2) CPM Schedule shall be cost loaded based on Schedule of Values as approved by District.
 - (3) Submit schedules and reports as specified in the General Conditions.
- B. Upon Award of Contract, Contractor shall immediately commence development of Initial and Original CPM Schedules to ensure compliance with CPM Schedule submittal requirements.

1.03 CONSTRUCTION SCHEDULE

- A. Within ten (10) days of being awarded the Contract and before request for first progress payment, the Contractor shall prepare and submit to the Project Manager a construction progress schedule conforming to the Milestone Schedule below.
- B. The Construction Schedule shall be continuously updated, and an updated schedule shall be submitted with each application for progress payment. Each revised schedule shall indicate the work actually accomplished during the previous period and the schedule for completion of the remaining work.

C. Milestone Schedule:

ACTIVITY DESCRIPTION

REQUIRED COMPLETION

**CONSTRUCTION STARTS [DATE]
FINAL PROJECT COMPLETION**

[DATE]

1.04 QUALIFICATIONS

A. Contractor shall employ experienced scheduling personnel qualified to use the latest version of [i.e., Primavera Project Planner]. Experience level required is set forth below. Contractor may employ such personnel directly or may employ a consultant for this purpose.

- (1) The written statement shall identify the individual who will perform CPM scheduling.
- (2) Capability and experience shall be verified by description of construction projects on which individual has successfully applied computerized CPM.
- (3) Required level of experience shall include at least two (2) projects of similar nature and scope with value not less than three fourths ($\frac{3}{4}$) of the Total Bid Price of this Project. The written statement shall provide contact persons for referenced projects with current telephone and address information.

B. District reserves the right to approve or reject Contractor’s scheduler or consultant at any time. District reserves the right to refuse replacing of Contractor’s scheduler or consultant, if District believes replacement will negatively affect the scheduling of Work under this Contract.

1.05 GENERAL

A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.

B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in the Contract, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.

- (1) District is not required to accept an early completion schedule, i.e., one that shows an earlier completion date than the Contract Time.
- (2) Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier completion schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in its early completion schedule but within the Contract Time.

- (3) A schedule showing the work completed in less than the Contract Time, and that has been accepted by District, shall be considered to have Project Float. The Project Float is the time between the scheduled completion of the work and the Completion Date. Project Float is a resource available to both District and the Contractor.
- C. Ownership Project Float: Neither the District nor Contractor owns Project Float. The Project owns the Project Float. As such, liability for delay of the Completion Date rests with the party whose actions, last in time, actually cause delay to the Completion Date.
- (1) For example, if Party A uses some, but not all of the Project Float and Party B later uses remainder of the Project Float as well as additional time beyond the Project Float, Party B shall be liable for the time that represents a delay to the Completion Date.
 - (2) Party A would not be responsible for the time since it did not consume the entire Project Float and additional Project Float remained; therefore, the Completion Date was unaffected by Party A.
- D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract CPM Schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.
- E. Failure of Progress Schedule to include any element of the Work, or any inaccuracy in Progress Schedule, will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.
- F. Software: Use **[i.e., District Project Planner for Windows, latest version]**. Such software shall be compatible with Windows operating system. Contractor shall transmit contract file to District on compact disk at times requested by District.
- G. Transmit each item under the form approved by District.
- (1) Identify Project with District Contract number and name of Contractor.
 - (2) Provide space for Contractor's approval stamp and District's review stamps.
 - (3) Submittals received from sources other than Contractor will be returned to the Contractor without District's review.

1.06 INITIAL CPM SCHEDULE

- A. Initial CPM Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to ninety (90) calendar days after the Notice to Proceed.
- B. Indicate detailed plan for the Work to be completed in first ninety (90) days of the Contract; details of planned mobilization of plant and equipment; sequence of early operations; procurement of materials and equipment. Show Work beyond ninety (90) calendar days in summary form.
- C. Initial CPM Schedule shall be time scaled.
- D. Initial CPM Schedule shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments until acceptance of the Original CPM Schedule. Use of Initial CPM Schedule for progress payments shall not exceed ninety (90) calendar days.
- E. District and Contractor shall meet to review and discuss the Initial CPM Schedule within seven (7) calendar days after it has been submitted to District.
 - (1) District's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).
 - (2) Contractor shall make corrections to schedule necessary to comply with Contract requirements and shall adjust schedule to incorporate any missing information requested by District. Contractor shall resubmit Initial CPM Schedule if requested by District.
- F. If, during the first ninety (90) days after Notice to Proceed, the Contractor is of the opinion that any of the Work included on its Initial CPM Schedule has been impacted, the Contractor shall submit to District a written Time Impact Evaluation ("TIE") in accordance with Article 1.12 of this Section. The TIE shall be based on the most current update of the Initial CPM Schedule.

1.07 ORIGINAL CPM SCHEDULE

- A. Submit a detailed proposed Original CPM Schedule presenting an orderly and realistic plan for completion of the Work in conformance with requirements as specified herein.
- B. Progress Schedule shall include or comply with following requirements:
 - (1) Time scaled, cost and resource (labor and major equipment) loaded CPM schedule.
 - (2) No activity on schedule shall have duration longer than fifteen (15) work days, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District.

01 32 19 SCHEDULING OF WORK

- (a) Activity durations shall be total number of actual work days required to perform that activity.
- (3) The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.
- (4) District furnished materials and equipment, if any, identified as separate activities.
- (5) Activities for maintaining Project Record Documents.
- (6) Dependencies (or relationships) between activities.
- (7) Processing/approval of submittals and shop drawings for all material and equipment required per the Contract. Activities that are dependent on submittal acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates.
 - (a) Include time for submittals, re-submittals and reviews by District. Coordinate with accepted schedule for submission of Shop Drawings, samples, and other submittals.
 - (b) Contractor shall be responsible for all impacts resulting from re-submittal of Shop Drawings and submittals.
- (8) Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity.
 - (a) Include time for fabrication and delivery of manufactured products for the Work.
 - (b) Show dependencies between procurement and construction.
- (9) Activity description; what Work is to be accomplished and where.
- (10) The total cost of performing each activity shall be total of labor, material, and equipment, excluding overhead and profit of Contractor. Overhead and profit of the General Contractor shall be shown as a separate activity in the schedule. Sum of cost for all activities shall equal total Contract value.
- (11) Resources required (labor and major equipment) to perform each activity.
- (12) Responsibility code for each activity corresponding to Contractor or Subcontractor responsible for performing the Work.
- (13) Identify the activities which constitute the controlling operations or critical path. No more than twenty-five (25%) of the activities shall be critical or near critical. Near critical is defined as float in the range of one (1) to (10) days.

01 32 19 SCHEDULING OF WORK

- (14) Twenty (20) workdays for developing punch list(s), completion of punch-list items, and final clean up for the Work or any designated portion thereof. No other activities shall be scheduled during this period.
 - (15) Interface with the work of other contractors, District, and agencies such as, but not limited to, utility companies.
 - (16) Show detailed Subcontractor Work activities. In addition, furnish copies of Subcontractor schedules upon which CPM was built.
 - (a) Also furnish for each Subcontractor, as determined by District, submitted on Subcontractor letterhead, a statement certifying that Subcontractor concurs with Contractor's Original CPM Schedule and that Subcontractor's related schedules have been incorporated, including activity duration, cost and resource loading.
 - (b) Subcontractor schedules shall be independently derived and not a copy of Contractor's schedule.
 - (c) In addition to Contractor's schedule and resource loading, obtain from electrical, mechanical, and plumbing Subcontractors, and other Subcontractors as required by District, productivity calculations common to their trades, such as units per person day, feet of pipe per day per person, feet of wiring per day per person, and similar information.
 - (d) Furnish schedule for Contractor/Subcontractor CPM schedule meetings which shall be held prior to submission of Original CPM schedule to District. District shall be permitted to attend scheduled meetings as an observer.
 - (17) Activity durations shall be in Work days.
 - (18) Submit with the schedule a list of anticipated non-Work days, such as weekends and holidays. The Progress Schedule shall exclude in its Work day calendar all non-Work days on which Contractor anticipates critical Work will not be performed.
- C. Original CPM Schedule Review Meeting: Contractor shall, within sixty (60) days from the Notice to Proceed date, meet with District to review the Original CPM Schedule submittal.
- (1) Contractor shall have its Project Manager, Project Superintendent, Project Scheduler, and key Subcontractor representatives, as required by District, in attendance. The meeting will take place over a continuous one (1) day period.

- (2) District's review will be limited to submittal's conformance to Contract requirements including, but not limited to, coordination requirements. However, review may also include:
 - (a) Clarifications of Contract Requirements.
 - (b) Directions to include activities and information missing from submittal.
 - (c) Requests to Contractor to clarify its schedule.
- (3) Within five (5) days of the Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by District at the Meeting.

1.08 ADJUSTMENTS TO CPM SCHEDULE

- A. Adjustments to Original CPM Schedule: Contractor shall have adjusted the Original CPM Schedule submittal to address all review comments from original CPM Schedule review meeting and resubmit network diagrams and reports for District's review.
 - (1) District, within ten (10) days from date that Contractor submitted the revised schedule, will either:
 - (a) Accept schedule and cost and resource loaded activities as submitted, or
 - (b) Advise Contractor in writing to review any part or parts of schedule which either do not meet Contract requirements or are unsatisfactory for District to monitor Project's progress, resources, and status or evaluate monthly payment request by Contractor.
 - (2) District may accept schedule with conditions that the first monthly CPM Schedule update be revised to correct deficiencies identified.
 - (3) When schedule is accepted, it shall be considered the "Original CPM Schedule" which will then be immediately updated to reflect the current status of the work.
 - (4) District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may later be discovered to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.
- B. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.

- (1) By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.
 - (2) Upon submittal of schedule update, updated schedule shall be considered "current" CPM Schedule.
 - (3) Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including adverse effects such as delays resulting from ill-timed Work.
- C. Submittal of Original CPM Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the Schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.
 - D. Contractor shall distribute Original CPM Schedule to Subcontractors for review and written acceptance, which shall be noted on Subcontractors' letterheads to Contractor and transmitted to District for the record.

1.09 MONTHLY CPM SCHEDULE UPDATE SUBMITTALS

- A. Following acceptance of Contractor's Original CPM Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.
 - (1) Each schedule update submitted shall be complete, including all information requested for the Original CPM Schedule submittal.
 - (2) Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.
- B. A meeting will be held on approximately the twenty-fifth (25th) of each month to review the schedule update submittal and progress payment application.
 - (1) At this meeting, at a minimum, the following items will be reviewed: Percent (%) complete of each activity; Time Impact Evaluations for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Contractor delays.
 - (2) These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.

- (3) Contractor shall plan on the meeting taking no less than four (4) hours.
- C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated CPM Schedule update.
- D. Within five (5) work days of receipt of above noted revised submittals, District will either accept or reject monthly schedule update submittal.
 - (1) If accepted, percent (%) complete shown in monthly update will be basis for Application for Payment by the Contractor. The schedule update shall be submitted as part of the Contractor's Application for Payment.
 - (2) If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.
- E. Neither updating, changing or revising of any report, curve, schedule, or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall have the effect of amending or modifying in any way the Completion Date or milestone dates or of modifying or limiting in any way Contractor's obligations under this Contract.

1.10 SCHEDULE REVISIONS

- A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.
- B. To reflect revisions to the Schedule, the Contractor shall provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. The Contractor shall provide the written narrative and schedule diagram for revisions two (2) working days in advance of the monthly schedule update meeting.
- C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District. District may request further information and justification for schedule revisions and Contractor shall, within three (3) days, provide District with a complete written narrative response to District's request.
- D. If the Contractor's revision is still not accepted by District, and the Contractor disagrees with District's position, the Contractor has seven (7) calendar days from receipt of District's letter rejecting the revision to provide a written narrative providing full justification and explanation for the revision. The Contractor's failure to respond in writing within seven (7) calendar days of District's written rejection of a schedule revision shall be contractually

interpreted as acceptance of District's position, and the Contractor waives its rights to subsequently dispute or file a claim regarding District's position.

- E. At District's discretion, the Contractor can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

1.11 RECOVERY SCHEDULE

- A. If the Schedule Update shows a completion date twenty-one (21) calendar days beyond the Contract Completion Date, or individual milestone completion dates, the Contractor shall submit to District the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, the Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, the Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.
- B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District.
- C. If the Contractor's revisions are not accepted by District, District and the Contractor shall follow the procedures in paragraph 1.09.C, 1.09.D and 1.09.E above.
- D. At District's discretion, the Contractor can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

1.12 TIME IMPACT EVALUATION ("TIE") FOR CHANGE ORDERS, AND OTHER DELAYS

- A. When Contractor is directed to proceed with changed Work, the Contractor shall prepare and submit within fourteen (14) calendar days from the Notice to Proceed a TIE which includes both a written narrative and a schedule diagram depicting how the changed Work affects other schedule activities. The schedule diagram shall show how the Contractor proposes to incorporate the changed Work in the schedule and how it impacts the current schedule-update critical path. The Contractor is also responsible for requesting time extensions based on the TIE's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed Work to the scheduled critical path.
- B. Contractor shall be required to comply with the requirements of Paragraph 1.09.A for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.
- C. Contractor shall be responsible for all costs associated with the preparation of TIEs, and the process of incorporating them into the current schedule update. The Contractor shall provide District with four (4) copies of each TIE.

- D. Once agreement has been reached on a TIE, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Time may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

1.13 TIME EXTENSIONS

- A. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with the General Conditions.
- B. Where an event for which District is responsible impacts the projected Completion Date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment, and material the Contractor would expend to mitigate District-caused time impact. The Contractor shall submit its mitigation plan to District within fourteen (14) calendar days from the date of discovery of the impact. The Contractor is responsible for the cost to prepare the mitigation plan.
- C. Failure to request time, provide TIE, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.
- D. No time will be granted under this Contract for cumulative effect of changes.
- E. District will not be obligated to consider any time extension request unless the Contractor complies with the requirements of Contract Documents.
- F. Failure of the Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.
- G. If the Contractor does not submit a TIE within the required fourteen (14) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

1.14 SCHEDULE REPORTS

- A. Submit four (4) copies of the following reports with the Initial CPM Schedule, the Original CPM Schedule, and each monthly update.
- B. Required Reports:
 - (1) Two activity listing reports: one sorted by activity number and one by total Project Float. These reports shall also include each activity's early/late and actual start and finish dates, original and remaining duration, Project Float, responsibility code, and the logic relationship of activities.

- (2) Cost report sorted by activity number including each activity's associated cost, percentage of Work accomplished, earned value- to date, previous payments, and amount earned for current update period.
- (3) Schedule plots presenting time-scaled network diagram showing activities and their relationships with the controlling operations or critical path clearly highlighted.
- (4) Cash flow report calculated by early start, late start, and indicating actual progress. Provide an exhibit depicting this information in graphic form.
- (5) Planned versus actual resource (i.e., labor) histogram calculated by early start and late start.

C. Other Reports:

In addition to above reports, District may request, from month to month, any two of the following reports. Submit four (4) copies of all reports.

- (1) Activities by early start.
- (2) Activities by late start.
- (3) Activities grouped by Subcontractors or selected trades.
- (4) Activities with scheduled early start dates in a given time frame, such as fifteen (15) or thirty (30) day outlook.

D. Furnish District with report files on compact disks containing all schedule files for each report generated.

1.15 PROJECT STATUS REPORTING

- A. In addition to submittal requirements for CPM scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each CPM Schedule as specified herein. Status reporting shall be in form specified below.
- B. Contractor shall prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:
 - (1) Status of major Project components (percent (%) complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.
 - (2) Progress made on critical activities indicated on CPM Schedule.

- (3) Explanations for any lack of work on critical path activities planned to be performed during last month.
- (4) Explanations for any schedule changes, including changes to logic or to activity durations.
- (5) List of critical activities scheduled to be performed next month.
- (6) Status of major material and equipment procurement.
- (7) Any delays encountered during reporting period.
- (8) Contractor shall provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.
 - (a) Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in computer-generated monthly and weekly printed reports.
 - (b) Contractor shall explain all variances and mitigation measures.
- (9) Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by District at no additional cost.
- (10) Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

1.16 WEEKLY SCHEDULE REPORT

At the Weekly Progress Meeting, the Contractor shall provide and present a time-scaled three (3) week look-ahead schedule that is based and correlated by activity number to the current schedule (i.e., Initial, Original CPM, or Schedule Update).

1.17 DAILY CONSTRUCTION REPORTS

On a daily basis, Contractor shall submit a daily activity report to District for each workday, including weekends and holidays when worked. Contractor shall develop the daily construction reports on a computer-generated database capable of sorting daily Work, manpower, and man-hours by Contractor, Subcontractor, area, sub-area, and Change Order Work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of daily construction report data base format prior to implementation. Include in report:

- A. Project name and Project number.
- B. Contractor's name and address.

- C. Weather, temperature, and any unusual site conditions.
- D. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.
- E. Worker quantities for its own Work force and for Subcontractors of any tier.
- F. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

1.18 PERIODIC VERIFIED REPORTS

Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports on the first day of February, May, August, and November during the preceding quarter year; at the completion of the Contract; at the completion of the Work; at the suspension of Work for a period of more than one (1) month; whenever the services of Contractor or any of Contractor's Subcontractors are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs at monthly duration.
- B. See Section 01 77 00 Closeout Procedures for submitting digital media as Project Record Documents at Project closeout.

1.2 SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.
- B. Construction Photographs: Submit 2 prints of each photographic view within 7 days of taking photographs.
 - 1. Format: 8 inches by 10 inches smooth surface matte prints on single weight commercial grade photographic paper, enclosed back to back in clear plastic sleeves that are punched for standard 3 ring binder.
 - 2. Identification: On back of each print, provide an applied label or rubber stamped impression with the following information:
 - a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of the Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken if not date stamped by camera.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier.
 - 3. Digital Images: Electronically submit a complete set of digital image electronic files with each submittal of prints as a Project Record Document. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

1.3 COORDINATION

- A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well lit photographs without obscuring shadows.

1.4 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to the Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1600 by 1200 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out of focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Film Images
 - 1. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
 - 2. Field Office Prints: Retain 1 set of prints of progress photographs in the field office at Project site, available at all times for reference. Identify photographs same as for those submitted to the Architect.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image editing software.
 - 1. Date and Time: Include date and time in filename for each image.
 - 2. Field Office Images: Electronically maintain 1 set of images in the field office at the Project site, available at all times for reference. Identify images same as for those submitted to the Architect.
- D. Preconstruction Photographs: Before commencement of demolition, take color, digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by the Architect.
 - 1. Flag construction limits before taking construction photographs.
 - 2. Take 8 photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take 8 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
- E. Periodic Construction Photographs: Take 12 color, digital photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- F. Additional Photographs: The Architect may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
 - 1. Where feasible, 3 days' notice will be given.
 - 2. In emergency situations, take additional photographs within 24 hours of request.
 - 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.

- b. Immediate follow-up when on site events result in construction damage or losses.
- c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit cost allowances.
- d. Substantial Completion of a major phase or component of the Work.
- e. Extra record photographs at time of final acceptance.
- f. Owner's request for special publicity photographs.

END OF SECTION

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;
- B. Special Conditions.

1.02 SECTION INCLUDES:

- A. Definitions:
 - (1) Shop Drawings and Product Data are as indicated in the General Conditions and include, but are not limited to, fabrication, erection, layout and setting drawings, formwork and falsework drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams. In addition, there are 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 all positions conform to the requirement of the Contract Documents, including, without limitation, the Drawings.
 - (2) "Manufactured" applies to standard units usually mass-produced; "fabricated" means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicated proper relation to adjoining work and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.
 - (3) Manufacturer's Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed, at a minimum, in accordance with a specified product manufacturer's instructions, the Contractor shall procure and distribute copies of these to the District, the Architect, and all other concerned parties and shall furnish, install, or perform the work, at a minimum, in accordance with those instructions.

- B. Samples, Shop Drawings, Product Data, and other items as specified, in accordance with the following requirements:
- (1) Contractor shall submit all Shop Drawings, Product Data, and Samples to the District, the Architect, the Project Inspector, and the Construction Manager.
 - (2) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such Shop Drawings, Product Data, and/or Samples.
 - (3) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall allow sufficient time so that no delay occurs due to required lead time in ordering or delivery of any item to the Site. Contractor shall be responsible for any delay in progress of Work due to its failure to observe these requirements.
 - (4) Time for completion of Work shall not be extended on account of Contractor's failure to promptly submit Shop Drawings, Product Data, and/or Samples.
 - (5) Reference numbers on Shop Drawings shall have Architectural and/or Engineering Contract Drawings reference numbers for details, sections, and "cuts" shown on Shop Drawings. These reference numbers shall be in addition to any numbering system that Contractor chooses to use or has adopted as standard.
 - (6) When the magnitude or complexity of submittal material prevents a complete review within the stated time frame, Contractor shall make this submittal in increments to avoid extended delays.
 - (7) Contractor shall certify on submittals for review that submittals conform to Contract requirements. In event of any variance, Contractor shall specifically state in transmittal and on Shop Drawings, portions vary and require approval of a substitute. Also certify that Contractor-furnished equipment can be installed in allocated space.
 - (8) Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standard of the American Society for Testing and Materials.
 - (9) Upon demand by Architect or District, Contractor shall submit samples of materials and/or articles for tests or examinations and consideration before Contractor incorporates same in Work. Contractor shall be solely responsible for delays due to sample(s) not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples that are of value after testing will remain the property of Contractor.

- C. Submittal Schedule:
- (1) Contractor shall prepare its proposed submittal schedule that is coordinated with the proposed construction schedule and submit both to the District within ten (10) days after the date of the Notice to Proceed. Contractor's proposed schedules shall become the Project Construction Schedule and the Project Submittal Schedule after each is approved by the District.
 - (2) Contractor is responsible for all lost time should the initial submittal be rejected, marked "revise and resubmit", etc.
 - (3) All Submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those Submittals shall be forwarded to the District so as not to delay the Construction Schedule.

1.03 SHOP DRAWINGS:

- A. Contractor shall submit one reproducible transparency and six (6) opaque reproductions. The District will review and return the reproducible copy and one (1) opaque reproduction to Contractor.
- B. Before commencing installation of any Work, the Contractor shall submit and receive approval of all drawings, descriptive data, and material list(s) as required to accomplish Work.
- C. Review of Shop Drawings is regarded as a service to assist Contractor and in all cases original Contract Documents shall take precedence as outlined under General Conditions.
- D. No claim for extra time or payment shall be based on work shown on Shop Drawings unless the claim is (1) noted on Contractor's transmittal letter accompanying Shop Drawings and (2) Contractor has complied with all applicable provisions of the General Conditions, including, without limitation, provisions regarding changes and payment, and all required written approvals.
- E. District shall not review Shop Drawings for quantities of materials or number of items supplied.
- F. District's and/or Architect's review of Shop Drawing will be general. District and/or Architect review does not relieve Contractor of responsibility for dimensions, accuracy, proper fitting, construction of Work, furnishing of materials, or Work required by Contract Documents and not indicated on Shop Drawings. The District's and/or Architect's review of Shop Drawings is not to be construed as approving departures from Contract Documents.
- G. Review of Shop Drawings and Schedules does not relieve Contractor from responsibility for any aspect of those Drawings or Schedules that is a violation of local, County, State, or Federal laws, rules, ordinances, or rules and

regulations of commissions, boards, or other authorities or utilities having jurisdiction.

- H. Before submitting Shop Drawings for review, Contractor shall check Shop Drawings of its subcontractors for accuracy, and confirm that all Work contiguous with and having bearing on other work shown on Shop Drawings is accurately drawn and in conformance with Contract Documents.
- I. Submitted drawings and details must bear stamp of approval of Contractor:
 - (1) Stamp and signature shall clearly certify that Contractor has checked Shop Drawings for compliance with Drawings.
 - (2) If Contractor submits a Shop Drawing without an executed stamp of approval, or whenever it is evident (despite stamp) that Drawings have not been checked, the District and/or Architect will not consider them and will return them to the Contractor for revision and resubmission. In that event, it will be deemed that Contractor has not complied with this provision and Contractor shall bear risk of all delays to same extent as if it had not submitted any Shop Drawings or details.
- J. Submission of Shop Drawings (in either original submission or when resubmitted with correction) constitutes evidence that Contractor has checked all information thereon and that it accepts and is willing to perform Work as shown.
- K. Contractor shall pay for cost of any changes in construction due to improper checking and coordination. Contractor shall be responsible for all additional costs, including coordination. Contractor shall be responsible for costs incurred by itself, the District, the Architect, the Project Inspector, the Construction Manager, any other Subcontractor or contractor, etc., due to improperly checked and/or coordination of submittals.
- L. Shop Drawings must clearly delineate the following information:
 - (1) Project name and address.
 - (2) Specification number and description.
 - (3) Architect's name and project number.
 - (4) Shop Drawing title, number, date, and scale.
 - (5) Names of Contractor, Subcontractor(s) and fabricator.
 - (6) Working and erection dimensions.
 - (7) Arrangements and sectional views.
 - (8) Necessary details, including complete information for making connections with other Work.

- (9) Kinds of materials and finishes.
 - (10) Descriptive names of materials and equipment, classified item numbers, and locations at which materials or equipment are to be installed in the Work. Contractor shall use same reference identification(s) as shown on Contract Drawings.
- M. Contractor shall prepare composite drawings and installation layouts when required to solve tight field conditions.
- (1) Shop Drawings shall consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences, etc.
 - (2) Contractor shall coordinate these composite Shop Drawings and installation layouts in the field between itself and its Subcontractor(s) for proper relationship to the Work, the work of other trades, and the field conditions. The Contractor shall check and approve all submittal(s) before submitting them for final review.

1.04 PRODUCT DATA OR NON REPRODUCIBLE SUBMITTALS:

- A. Contractor shall submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Contractor must submit a minimum of six (6) each, to the District. District shall return one (1) to the Contractor, who shall reproduce whatever additional copies it requires for distribution.
- B. Contractor shall submit six (6) copies of a complete list of all major items of mechanical, plumbing, and electrical equipment and materials in accordance with the approved Submittal Schedule, except as required earlier to comply with the approved Construction Schedule. Other items specified are to be submitted prior to commencing Work. Contractor shall submit items of like kind at one time in a neat and orderly manner. Partial lists will not be acceptable.
- C. Submittals shall include manufacturer's specifications, physical dimensions, and ratings of all equipment. Contractor shall furnish performance curves for all pumps and fans. Where printed literature describes items in addition to that item being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out. If highlighting is used, Contractor shall mark all copies.
- D. Equipment submittals shall be complete and include space requirements, weight, electrical and mechanical requirements, performance data, and supplemental information that may be requested.
- E. Imported Materials Certification must be submitted at least ten (10) days before material is delivered.

1.05 SAMPLES:

- A. Contractor shall submit for approval Samples as required and within the time frame in the Contract Documents. Materials such as concrete, mortar, etc., which require on-site testing will be obtained from Project Site.
- B. Contractor shall submit four (4) samples except where greater or lesser number is specifically required by Contract Documents including, without limitation, the Specifications.
 - (1) Samples must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.
 - (2) Samples must show full range of texture, color, and pattern.
- C. Contractor shall make all Submittals, unless it has authorized Subcontractor(s) to submit and Contractor has notified the District in writing to this effect.
- D. Samples to be shipped prepaid or hand-delivered to the District.
- E. Contractor shall mark samples to show name of Project, name of Contractor submitting, Contract number and segment of Work where representative Sample will be used, all applicable Specifications Sections and documents, Contract Drawing Number and detail, and ASTM or FS reference, if applicable.
- F. Contractor shall not deliver any material to Site prior to receipt of District's and/or Architect's completed written review and approval. Contractor shall furnish materials equal in every respect to approved Samples and execute Work in conformance therewith.
- G. District's and/or Architect's review, acceptance, and/or approval of Sample(s) will not preclude rejections of any material upon discovery of defects in same prior to final acceptance of completed Work.
- H. After a material has been approved, no change in brand or make will be permitted.
- I. Contractor shall prepare its Submittal Schedule and submit Samples of materials requiring laboratory tests to specified laboratory for testing not less than ninety (90) days before such materials are required to be used in Work.
- J. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other information required.
- K. Field Samples and Mock-Ups are to be removed by Contractor at District's direction:
 - (1) Size: As Specified.
 - (2) Furnish catalog numbers and similar data, as requested.

1.06 REVIEW AND RESUBMISSION REQUIREMENTS:

- A. The District will arrange for review of Sample(s), Shop Drawing(s), Product Data, and other submittal(s) by appropriate reviewer and return to Contractor as provided below within twenty-one (21) days after receipt or within twenty-one (21) days after receipt of all related information necessary for such review, whichever is later.
- B. One (1) copy of product or materials data will be returned to Contractor with the review status.
- C. Samples to be incorporated into the Work will be returned to Contractor, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review, if any. Other Samples will not be returned, but the same notice will be given with respect thereto, and that notice shall be considered a return of the Sample.
- D. Contractor shall revise and resubmit any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) as required by the reviewer. Such resubmittals will be reviewed and returned in the same manner as original Sample(s), Shop Drawing(s), Product Data, and other submittal(s), within fourteen (14) days after receipt thereof or within fourteen (14) days after receipt of all related information necessary for such review. Such resubmittal shall not delay the Work.
- E. Contractor may proceed with any of the Work covered by Sample(s), Shop Drawing(s), Product Data, and other submittal(s) upon its return if designated as no exception taken, or revise as noted, provided the Contractor proceeds in accordance with the District and/or the Architect's notes and comments.
- F. Contractor shall not begin any of the work covered by a Sample(s), Shop Drawing(s), Product Data, and other submittal(s), designated as revise and resubmit or rejected, until a revision or correction thereof has been reviewed and returned to Contractor.
- G. Sample(s), Shop Drawing(s), Product Data, and other submittal(s) designated as revise and resubmit or rejected and requiring resubmittal, shall be revised or corrected and resubmitted to the District no later than fourteen (14) days or a shorter period as required to comply with the approved Construction Schedule, after its return to Contractor.
- H. Neither the review nor the lack of review of any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) shall waive any of the requirements of the Contract Documents, or relieve Contractor of any obligation thereunder.
- I. District's and/or Architect's review of Shop Drawings does not relieve the Contractor of responsibility for any errors that may exist. Contractor is responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all the Work.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

SITE STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;
- B. Special Conditions;
- C. Drug-Free Workplace Certification;
- D. Tobacco-Free Environment Certification;
- E. Criminal Background Investigation/Fingerprinting Certification;
- F. Temporary Facilities and Controls.

1.02 REQUIREMENTS OF THE DISTRICT:

- A. Drug-Free Schools and Safety Requirements:
 - (1) All school sites and other District Facilities have been declared “Drug-Free Zones.” No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or contractors are to use drugs on these sites.
 - (2) Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. Contractor shall post: "Non-Smoking Area" in a highly visible location in each work area, staging area, and parking area. Contractor may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.
 - (3) Contractor shall ensure that no alcohol, firearms, weapons, or controlled substances enter or are used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.
- B. Language: Profanity or other unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students, staff, volunteers, parents or public will not be allowed.

- C. Disturbing the Peace (Noise and Lighting):
- (1) Contractor shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.
 - (2) The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use. District reserves the right to prohibit the use of radios at the Site, except for mobile phones or other handheld communication radios.
 - (3) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.
- D. Traffic:
- (1) Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on-the Premises shall be five (5) miles per hour (maximum) or less if conditions require.
 - (2) All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Contractor.
 - (3) District shall designate a construction entry to the Site. If Contractor requests, District determines it is required, and to the extent possible, District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with District and at Contractor's expense.
 - (4) Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in softscape areas that could otherwise be damaged.
- E. All of the above shall be observed and complied with by the Contractor and all workers on the Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District. The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Obtaining of Permits, Licenses and Registrations and Work to Comply with All Applicable Laws and Regulations;
- B. Special Conditions; and
- C. Quality Control.

1.02 DESCRIPTION:

This section covers the general requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.03 REQUIREMENTS OF REGULATORY AGENCIES:

- A. All statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction over the Work, are hereby incorporated into these Contract Documents as if repeated in full herein and are intended to be included in any reference to Code or Building Code, unless otherwise specified, including, without limitation, the references in the list below. Contractor shall make available at the Site copies of all the listed documents applicable to the Work as the District and/or Architect may request, including, without limitation, applicable portions of the California Code of Regulations ("CCR").
 - (1) California Building Standards Administrative Code, Part 1, Title 24, CCR.
 - (2) California Building Code (CBC), Part 2, Title 24, CCR; (Uniform Building code volumes 1-3 and California Amendments).
 - (3) California Electrical Code (CEC), Part 3, Title 24, CCR; (National Electrical Code and California Amendments).
 - (4) California Mechanical Code (CMC), Part 4, Title 24, CCR; (Uniform Mechanical Code and California Amendments).

- (5) California Plumbing Code (CPC), Part 5, Title 24, CCR; (Uniform Plumbing Code and California Amendments).
- (6) California Fire Code (CFC), Part 9, Title 24, CCR; (Fire Plumbing Code and California Amendments).
- (7) California Referenced Standards Code, Part 12, Title 24, CCR.
- (8) State Fire Marshal Regulations, Public Safety, Title 19, CCR.
- (9) Partial List of Applicable National Fire Protection Association (NFPA) Standards:
 - (a) NFPA 13 - Automatic Sprinkler System.
 - (b) NFPA 14 - Standpipes Systems.
 - (c) NFPA 17A - Wet Chemical System
 - (d) NFPA 24 - Private Fire Mains.
 - (e) (California Amended) NFPA 72 - National Fire Alarm Codes.
 - (f) NFPA 253 - Critical Radiant Flux of Floor Covering System.
 - (g) NFPA 2001 - Clean Agent Fire Extinguishing Systems.
- (10) California Division of the State Architect interpretation of Regulations ("DSA IR"), including, without limitation:
 - (a) DSA IR A-6 — Construction Change Document Submittal and Approval Processes.
 - (b) DSA IR A-7 — Project Inspector Certification and Approval.
 - (c) DSA IR A-8 — Project Inspector and Assistant Inspector Duties and Performance.
 - (d) DSA IR A-12 — Assistant Inspector Approval.
- (11) DSA Procedures ("DSA PR")
 - (a) DSA PR 13-01 – Construction Oversight Process
 - (b) DSA PR 13-02 – Project Certification Process

B. This Project shall be governed by applicable regulations, including, without limitation, the State of California's Administrative Regulations for the Division of the State Architect-Structural Safety (DSA/SS), Chapter 4, Part 1, Title 24, CCR, and the most current version on the date the bids are opened and as it pertains to school construction including, without limitation:

- (1) Test and testing laboratory per Section 4-335. District shall pay for the testing laboratory.
- (2) Special inspections per Section 4-333(c).
- (3) Deferred Approvals per section 4-317(g).
- (4) Verified reports per Sections 4-335/336 & 4-343 (or 4-220)
- (5) Duties of the Architect & Engineers shall be per Sections 4-333(a) and 4-341.
- (6) Duties of the Contractor shall be per Section 4-343.
- (7) Duties of Project Inspector shall be per Section 4-211, 4-219,4-333 and 4-342.
- (8) Addenda and Construction Changes per Section 4-338.

Contractor shall keep and make available a copy of Part 1 and 2 of the most current versions of Title 24 at the Site during construction as well as all applicable parts referenced by the plan and specification.

- C. Items of deferred approval shall be clearly marked on the first sheet of the Architect's and/or Engineer's approved Drawings. All items later submitted for approval shall be per Title 24 requirements to the DSA.
- (1) Contractor shall submit the following to Architect for review and endorsement:
 - (a) Product information on proposed material/system supplier.
 - (b) Drawings, specifications, and calculations prepared, signed, and stamped by an architect or engineer licensed in the State of California for that portion of the Work.
 - (c) All other requirements as may be required by DSA.
 - (2) Cost of preparing and submitting documentation per DSA Deferred Approval requirements including required modifications to Drawings and Specifications, whether or not indicated in the Contract Documents, shall be borne by Contractor.
 - (3) Contractor shall not begin fabrication and installation of deferred approval items without first obtaining DSA approval of Drawings and Specifications.
 - (4) Schedule of Work Subject to DSA Deferred Approval: Window wall systems exceeding 10 feet in span

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

ABBREVIATIONS AND ACRONYMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

1.02 DOCUMENT INCLUDES:

- A. Abbreviations used throughout the Contract Documents.
- B. Reference to a technical society, organization, or body is by abbreviation, as follows:

1.	AA	The Aluminum Association
2.	AAMA	American Architectural Manufacturers Association
3.	AASHTO	American Association of State Highway and Transportation Officials
4.	ABPA	Acoustical and Board Products Association
5.	ACI	American Concrete Institute
6.	AGA	American Gas Association
7.	AGC	Associated General Contractors of America
8.	AHC	Architectural Hardware Consultant
9.	AI	Asphalt Institute
10.	AIA	American Institute of Architects
11.	AIEE	American Institute of Electrical Engineers
12.	AISC	American Institute of Steel Construction
13.	AISI	American Iron and Steel Institute
14.	AMCA	Air Moving and Conditioning Association
15.	ANSI	American National Standards Institute
16.	APA	American Plywood Association
17.	ARI	Air Conditioning and Refrigeration Institute
18.	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
19.	ASME	American Society of Mechanical Engineers
20.	ASSE	American Society of Structural Engineers
21.	ASTM	American Society of Testing and Materials
22.	AWPB	American Wood Preservers Bureau
23.	AWPI	American Wood preservers Institute
24.	AWS	American Welding Society
25.	AWSC	American Welding Society Code
26.	AWI	Architectural Woodwork Institute

27.	AWWA	American Water Works Association
28.	BIA	Brick Institute of America
29.	CCR	California Code of Regulations
30.	CLFMI	Chain Link Fence Manufacturers Institute
31.	CMG	California Masonry Guild
32.	CRA	California Redwood Association
33.	CRSI	Concrete Reinforcing Steel Institute
34.	CS	Commercial Standards
35.	CSI	Construction Specifications Institute
36.	CTI	Cooling Tower Institute
37.	FGMA	Flat Glass Manufacturer's Association
38.	FIA	Factory Insurance Association
39.	FM	Factory Mutual
40.	FS	Federal Specification
41.	FTI	Facing Title Institute
42.	GA	Gypsum Association
43.	ICC	International Code Council
44.	IEEE	Institute of Electrical and Electronic Engineers
45.	IES	Illumination Engineering Society
46.	LIA	Lead Industries Association
47.	MIA	Marble Institute of America
48.	MLMA	Metal Lath Manufacturers Association
49.	MS	Military Specifications
50.	NAAMM	National Association of Architectural Metal Manufacturers
51.	NBHA	National Builders Hardware Association
52.	NBFU	National Board of Fire Underwriters
53.	NBS	National Bureau of Standards
54.	NCMA	National Concrete Masonry Association
55.	NEC	National Electrical Code
56.	NEMA	National Electrical Manufacturers Association
57.	NFPA	National Fire Protection Association/National Forest Products Association
58.	NMWIA	National Mineral Wool Insulation Association
59.	NTMA	National Terrazzo and Mosaic Association
60.	NWMA	National Woodwork Manufacturer's Association
61.	ORS	Office of Regulatory Services (California)
62.	OSHA	Occupational Safety and Health Act
63.	PCI	Precast Concrete Institute
64.	PCA	Portland Cement Association
65.	PDCA	Painting and Decorating Contractors of America
66.	PDI	Plumbing Drainage Institute
67.	PEI	Porcelain Enamel Institute
68.	PG&E	Pacific Gas & Electric Company
69.	PS	Product Standards
70.	SDI	Steel Door Institute; Steel Deck Institute
71.	SJI	Steel Joist Institute
72.	SSPC	Steel Structures Painting Council
73.	TCA	Tile Council of America
74.	TPI	Truss Plate Institute
75.	UBC	Uniform Building Code

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76.	UL	Underwriters Laboratories Code
77.	UMC	Uniform Mechanical Code
78.	USDA	United States Department of Agriculture
79.	VI	Vermiculite Institute
80.	WCLA	West Coast Lumberman's Association
81.	WCLB	West Coast Lumber Bureau
82.	WEUSER	Western Electric Utilities Service Engineering Requirements
83.	WIC	Woodwork Institute of California
84.	WPOA	Western Plumbing Officials Association

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, Contractor shall comply with requirements of the standard, except when more rigid requirements are specified in the Contract Documents, or are required by applicable codes.
- B. Contractor shall conform to current reference standard publication date in effect on the date of bid opening.
- C. Contractor shall obtain copies of standards unless specifically required not to by the Contract Documents.
- D. Contractor shall maintain a copy of all standards at jobsite during submittals, planning, and progress of the specific Work, until final completion, unless specifically required not to by the Contract Documents.
- E. Should specified reference standards conflict with Contract Documents, Contractor shall request clarification from the District and/or the Architect before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the contractual relationship as indicated in the Contract Documents by mention or inference otherwise in any referenced document.
- G. Governing Codes shall be as shown in the Contract Documents including, without limitation, the Specifications.

PART 2 – PRODUCTS Not Used

PART 3 – EXECUTION Not Used

END OF DOCUMENT

REFERENCES**PART 1 - GENERAL****1.01 SCHEDULE OF REFERENCES:**

The following information is intended only for the general assistance of the Contractor, and the District does not represent that all of the information is current. It is the Contractor's responsibility to verify the correct information for each of the entities listed.

AA	The Aluminum Association 1400 Crystal Drive, Suite 430 Arlington, VA 22202 www.aluminum.org	703/358-2960
AABC	Associated Air Balance Council 1518 K Street, NW, Suite 503 Washington, DC 20005 www.aabc.com	202/737-0202
AAMA	American Architectural Manufacturers Association 1827 Walden Office Sq., Suite 550 Schaumburg, IL 60173-4268 www.aamanet.org	847/303-5664
AASHTO	American Association of State Highway and Transportation Officials 444 N Capitol St. NW - Suite 249 Washington, DC 20001 www.transportation.org	202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 One Davis Drive Research Triangle Park, NC 27709 2215 www.aatcc.org	919/549-8141
ACA	American Coatings Association 1500 Rhode Island Ave., NW Washington DC, 20005 www.paint.org	202/462-6272

ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439 www.concrete.org	248/848-3700
ACPA	American Concrete Pipe Association 8445 Freeport Parkway, Suite 350 Irving, TX 75063-2595 www.concrete-pipe.org	972/506-7216
ADC	Air Duct Council 1901 N. Roselle Road, Suite 800 Schaumburg, Illinois 60195 www.flexibleduct.org	847/706-6750
AF&PA	American Forest and Paper Association 1101 K Street, NW, Suite 700 Washington, DC 20005 www.afandpa.org	202/463-2700
AGA	American Gas Association 400 North Capitol Street, NW Washington, DC 20001 www.aga.org	202/824-7000
AGC	Associate General Contractors of America 2300 Wilson Blvd., Suite 300 Arlington, VA 22201 www.agc.org	703/548-3118
AHA	American Hardboard Association 1210 West Northwest Highway Palatine, IL 60067 domensino.com/AHA/default.htm	847/934-8800
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480 www.asphaltinstitute.org	859/288-4960
AIA	The American Institute of Architects 1735 New York Ave., NW Washington, DC 20006-5292 www.aia.org	202/626-7300
AISC	American Institute of Steel Construction 130 East Randolph Street Suite 2000 Chicago, IL 60601 www.aisc.org	312.670.2400

AIA	American Insurance Association (formerly the National Board of Fire Underwriters) 555 12th St, NW, Suite 550 Washington DC 20004 www.aiadc.org	202/828-7100
AISI	American Iron and Steel Institute 25 Massachusetts Ave., NW, Suite 800 Washington, DC 20001 www.steel.org	202/452.7100
AITC	American Institute of Timber Construction 7012 S. Revere Parkway Suite 140 Centennial, CO 80112 www.aitc-glulam.org	503/639.0651
ALI	Associated Laboratories, Inc. P.O. Box 152837 Dallas, TX 75315 www.assoc-labs.com	214/565-0593
ALSC	American Lumber Standards Committee, Inc. 7470 New Technology Way, Suite F Frederick, MD 21703 www.alsc.org	301/972-1700
AMCA	Air Movement and Control Association International, Inc. 30 W. University Drive Arlington Heights, IL 60004 www.amca.org	847/394-0150
ANLA	American Nursery & Landscape Association (now AmericanHort) 525 9 th St NW, Suite 80 Washington, DC 20004 www.americanhort.org	202/789-2900
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC, 20036 www.ansi.org	202/293.8020
APA	APA-The Engineered Wood Association 7011 S. 19th Street Tacoma, WA 98466-5333 www.apawood.org	253/565-6600

APA	Architectural Precast Association 325 John Know Rd, Ste L103 Tallahassee, FL 32303 www.archprecast.org	850/205.5637
ARI	Air Conditioning and Refrigeration Institute (now Air-Conditioning, Heating, & Refrigeration Institute) 2111 Wilson Blvd, Suite 500 Arlington, VA 22201 www.ahrinet.org	703/524-8800
ARMA	Asphalt Roofing Manufacturers Association Public Information Department 750 National Press Building 529 14th Street, NW Washington, DC 20045 www.asphaltroofing.org	202/591-2450
ASA	The Acoustical Society of America ASA Office Manager Suite 1N01 2 Huntington Quadrangle Melville, NY 11747-4502 http://asa.aip.org	516/576-2360
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 www.asce.org	800/548-2723 703/295-6300
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329-2305 www.ashrae.org	800/527-4723 404/636-8400
ASLA	American Society of Landscape Architects 636 Eye Street, NW Washington, DC 20001-3736 www.asla.org	202/898-2444
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016-5990 www.asme.org	800/434-2763
ASPE	American Society of Plumbing Engineers 2980 S River Rd. Des Plaines, IL 60018 http://aspe.org	847/296-0002

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ASQ	American Society for Quality P.O. Box 3005 Milwaukee, WI 53201-3005 or 600 North Plankinton Avenue Milwaukee, WI 53203 http://asq.org	800/248-1946 414/272-8575
ASSE	American Society of Sanitary Engineering 901 Canterbury, Suite A Westlake, Ohio 44145 www.asse-plumbing.org	440/835-3040
ASTM	ASTM International 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA, 19428-2959 www.astm.org	610/832-9500
AWCI	Association of the Wall and Ceiling Industry 513 West Broad Street, Suite 210 Falls Church, VA 22046 www.awci.org	703/538-1600
AWPA	American Wood Protection Association P.O. Box 361784 Birmingham, AL 35236-1784 www.awpa.com	205/733-4077
AWPI	American Wood Preservers Institute 2750 Prosperity Ave. Suite 550 Fairfax, VA 22031-4312 www.arcat.com	800/356-AWPI 703/204-0500
AWS	American Welding Society 8669 Doral Boulevard, Suite 130 Doral, Florida 33166 www.aws.org	800/443-9353 305/443-9353
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165-5874 www.awinet.org	571/323-3636
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235 www.awwa.org	800/926-7337 303/794 7711

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BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 15th floor New York, NY 10017 www.buildershardware.com	212/297-2122
BIA	The Brick Industry Association 1850 Centennial Park Drive, Suite 301 Reston, VA 20191 www.gobrick.com	703/620-0010
CGA	Compressed Gas Association 14501 George Carter Way, Suite 103 Chantilly VA 20151-2923 www.cganet.com	703/788-2700
CISCA	Ceilings & Interior Systems Construction Association 1010 Jorie Blvd, Suite 30 Oak Brook, IL 60523 www.cisca.org	630/584-1919
CISPI	Cast Iron Soil Pipe Institute 1064 Delaware Avenue SE Atlanta, GA 30316 www.cispi.org	404/622-0073
CLFMI	Chain Link Fence Manufacturers Institute 10015 Old Columbia Road, Suite B-215 Columbia, MD 21046 www.associationsites.com/main-pub.cfm?usr=clfma	410/290-6267
CPA	Composite Panel Association 19465 Deerfield Avenue, Suite 306 Leesburg, VA 20176 www.compositepanel.org	703/724-1128
CPSC	Consumer Product Safety Commission 4330 East West Highway Bethesda, MD 20814 www.cpsc.gov	301/504-7923 800/638-2772
CRA	California Redwood Association 405 Enfrente Drive, Suite 200 Novato, CA 94949 www.calredwood.org	415/382-0662

CRI	Carpet and Rug Institute P.O. Box 2048 Dalton, Georgia 30722-2048 www.carpet-rug.org	706/278-3176
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173 4758 www.crsi.org	847/517-1200
CSI	The Construction Specifications Institute 110 South Union Street, Suite 100 Alexandria VA 22314 www.csinet.org	800/689-2900
CTIOA	Ceramic Tile Institute of America 12061 Jefferson Blvd. Culver City, CA 90230-6219 www.ctioa.org	310/574-7800
DHI	Door and Hardware Institute (formerly National Builders Hardware Association) 14150 Newbrook Dr. Chantilly, VA 20151 www.dhi.org	703/222-2010
DIPRA	Ductile Iron Pipe Research Association 2000 2nd Avenue, South Suite 429 Birmingham, AL 35233 www.dipra.org	205/402-8700
DOC	U.S. Department of Commerce 1401 Constitution Ave., NW Washington, D.C. 20230 www.commerce.gov	202/482-2000
DOT	U.S. Department of Transportation 1200 New Jersey Avenue, SE Washington, DC 20590 www.dot.gov	855/368-4200
EJMA	Expansion Joint Manufacturers Association, Inc. 25 North Broadway Tarrytown, NY 10591 www.ejma.org	914/332-0040

EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 www.epa.gov	202/272-0167
FCICA	Floor Covering Installation Contractors Association 7439 Millwood Drive West Bloomfield, MI 48322 www.fcica.com	248/661-5015 877/TO-FCICA
FM Global	Factory Mutual Insurance Company Amy Daley Global Practice Leader – Education, Public Entities, Health Care FM Global 270 Central Avenue Johnston, RI 02919-4949 www.fmglobal.com	401/275-3000 401/275-3029
FS	General Services Administration (GSA) Index of Federal Specifications, Standards and Commercial Item Descriptions 470 East L’Enfant Plaza, SW, Suite 8100 Washington, DC 20407 www.gsa.gov	202/619-8925
GA	The Gypsum Association 6525 Belcrest Road, Suite 480 Hyattsville, MD 20782 www.gypsum.org	301/277-8686
GANA	Glass Association of North America 800 SW Jackson St., Suite 1500 Topeka, KS 66612-1200 www.glasswebsite.com	785/271-0208
HMA	Hardwood Manufacturers Association 665 Rodi Road, Suite 305 Pittsburgh, PA 15235 http://hmamembers.org	412/244-0440
HPVA	Hardwood Plywood & Veneer Association 1825 Michael Faraday Drive Reston, Virginia 20190 www.hpva.org	703/435-2900

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IAPMO	International Association of Plumbing and Mechanical Officials (formerly the Western Plumbing Officials Association) 4755 E. Philadelphia St. Ontario, CA 91761 www.iapmo.org	909/472-4100
ICC	International Code Council 500 New Jersey Avenue, NW, 6th Floor Washington, DC 20001 www.iccsafe.org	888/422-7233
IEEE	Institute of Electrical and Electronics Engineers 3 Park Avenue, 17th Floor New York, NY 10016-5997 www.ieee.org	212/419-7900
IES	Illuminating Engineering Society 120 Wall Street, Floor 17 New York, NY 10005-4001 www.ies.org	212/248-5000
ITRK	Intertek Testing Services 3933 US Route 11 Cortland, NY 13045 www.intertek.com	607/753-6711
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive Rockville, MD 20850 www.mcaa.org	301/869-5800
MIA	Marble Institute of America 28901 Clemens Rd, Ste 100 Cleveland, OH 44145 www.marble-institute.com	440/250-9222
MMPA (formerly WMMPA)	Moulding & Millwork Producers Association (formerly Wood Moulding & Millwork Producers Association) 507 First Street Woodland, CA 95695 www.wmmpa.com	530/661-9591 800/550-7889

MSS	Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180-4602 http://mss-hq.org	703/281-6613
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Rd. Bldg. C, Suite 312 Glen Ellyn, IL 60137 www.naamm.org	630/942-6591
NAIMA	North American Insulation Manufacturers Association 44 Canal Center Plaza, Suite 310 Alexandria, VA 22314 www.naima.org	703/684-0084
NAPA	National Asphalt Pavement Association 5100 Forbes Blvd. Lanham, MD USA 20706-4407 www.asphaltpavement.org	888/468-6499 301/731-4748
NCSPA	National Corrugated Steel Pipe Association 14070 Proton Road, Suite 100 LB9 Dallas, TX 75244 www.ncspa.org	972/850-1907
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171-4662 www.ncma.org	703/713-1900
NEBB	National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877 www.nebb.org	301/977-3698
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814 www.necanet.org	301/657-3110
NEMA	National Electrical Manufacturers Association 1300 North 17th Street, Suite 1752 Rosslyn, Virginia 22209 www.nema.org	703/841-3200

NEII	National Elevator Industry, Inc. 1677 County Route 64 P.O. Box 838 Salem, New York 12865-0838 www.neii.org	518/854-3100
NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, Massachusetts USA 02169-7471 www.nfpa.org	617/770-3000
NHLA	National Hardwood Lumber Association PO Box 34518 Memphis, TN 38184 www.nhla.com	901/377-1818
NIA	National Insulation Association 12100 Sunset Hills Road, Suite 330 Reston, VA 20190 www.insulation.org	703/464-6422
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600 Rosemont, IL 60018-5607 www.nrca.net	847/299-9070
NSF	NSF International P.O. Box 130140 789 N. Dixboro Road Ann Arbor, MI 48113-0140, USA www.nsf.org	800/673-6275 734/769-8010
NTMA	National Terrazzo and Mosaic Association PO Box 2605 Fredericksburg, TX 78624 www.ntma.com	800/323-9736
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational Safety & Health Administration 200 Constitution Ave., NW Washington, D.C. 20210 www.osha.gov	800/321-OSHA (6742)

PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077 or 500 New Jersey Ave., N.W. 7 th Floor Washington, D.C. 20001 www.cement.org	847/966-6200 202/408-9494
PCI	Precast/Prestressed Concrete Institute 200 W. Adams St. #2100 Chicago, IL 60606 www.pci.org	312/786-0300
PDCA	Painting and Decorating Contractors of America 2316 Millpark Drive, Ste 220 Maryland Heights, MO 63043 www.pdca.com	800/332-PDCA (7322) 314/514-7322
PDI	Plumbing & Drainage Institute 800 Turnpike Street, Suite 300 North Andover, MA 01845 http://pdionline.org	978/557-0720 800/589-8956
PEI	Porcelain Enamel Institute, Inc. P.O. Box 920220 Norcross, GA 30010 www.porcelainenamel.com	770/676-9366
PG&E	Pacific Gas & Electric Company www.pge.com	800/743-5000
PLANET	Professional Landcare Network 950 Herndon Parkway, Suite 450 Herndon, Virginia 20170 www.landcarenetwork.org	703/736-9666 800/395-2522 703/736-9668
RFCI	Resilient Floor Covering Institute 115 Broad Street, Suite 201 La Grange GA 30240 www.rfci.com	706/882-3833
RIS	Redwood Inspection Service 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523 www.redwoodinspection.com	925/935-1499
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021 www.sdi.org	847/458-4647

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SDI	Steel Door Institute 30200 Detroit Road Westlake, Ohio 44145 www.steeldoor.org	440/899-0010
SJI	Steel Joist Institute 234 W. Cheves Street Florence, SC 29501 http://steeljoist.org	843/407-4091
SMA	Stucco Manufacturers Association 500 East Yale Loop Irvine, CA 92614 www.stuccomfgassoc.com	949/387.7611
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, Virginia 20151-1219 www.smacna.org	703/803-2980
SPI	SPI: The Plastics Industry Trade Association, Inc. 1667 K St., NW, Suite 1000 Washington, DC 20006 www.plasticsindustry.org	202/974-5200
SSPC	Society for Protective Coatings (formerly the Steel Structures Painting Council) 40 24th St 6th Fl Pittsburgh, PA 15222 www.sspc.org	412/281-2331 877/281-7772
TCA	The Tile Council of North America 100 Clemson Research Blvd. Anderson, SC 29625 www.tcnatile.com	864/646-8453
TPI	Truss Plate Institute 218 North Lee Street, Suite 312 Alexandria, VA 22314 www.tpinst.org	703/683-1010
TPI	Turfgrass Producers International 2 East Main Street East Dundee, IL 60118 www.turfgrassod.org	800/405-8873 847/649-5555

TCIA	Tree Care Industry Association (formerly the National Arborist Association) 136 Harvey Road, Suite 101 Londonderry, NH 03053 www.tcia.org	800/733-2622
TVI	The Vermiculite Institute c/o The Schundler Company 150 Whitman Avenue Edison, NJ. 08817 www.vermiculiteinstitute.org	732/287-2244
UL	Underwriters Laboratories Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 www.ul.com	847/272-8800 877/854-3577
UNI	Uni-Bell PVC Pipe Association 2711 LBJ Freeway, Suite 1000 Dallas, TX 75234 www.uni-bell.org	972/243-3902
USDA	U.S. Department of Agriculture 1400 Independence Ave., S.W. Washington, DC 20250 www.usda.gov	202/720-2791
WA	Wallcoverings Association 401 North Michigan Avenue Suite 2200 Chicago, IL 60611 www.wallcoverings.org	312/321-5166

WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97281 or 6980 S.W. Varns Tigard, OR 97223 www.wclib.org	503/639-0651
WCMA	Window Covering Manufacturers Association 355 Lexington Avenue 15th Floor New York, New York 10017 www.wcmanet.org	212/297-2122
WDMA	Window & Door Manufacturers Association 401 N. Michigan Avenue, Suite 2200 Chicago, IL 60611 or 2025 M Street, NW, Ste. 800 Washington, D.C. 20036-3309 www.wdma.com	312/321-6802 202/367-1157
WI	Woodwork Institute P.O. Box 980247 West Sacramento, CA 95798 www.wicnet.org	916/372-9943
WRI	Wire Reinforcement Institute 942 Main Street Hartford, CT 06103 www.wirereinforcementinstitute.org	860/240-9545
WWCA	Western Wall & Ceiling Contractors Association 1910 N. Lime St. Orange, California 92865 www.wwcca.org	714/221-5520
WWPA	Western Wood Products Association 522 SW Fifth Ave., Suite 500 Portland, OR 97204-2122 www2.wwpa.org	503/224-3930

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Purchase of Materials and Equipment;
- B. Special Conditions;
- C. Imported Materials Certification.

1.02 MATERIAL AND EQUIPMENT

- A. Only items approved by the District and/or Design Professional shall be used.
- B. Contractor shall submit lists of products and other product information in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

1.03 MATERIAL AND EQUIPMENT COLORS

- A. The District and/or Architect will provide a schedule of colors.
- B. No individual color selections will be made until after approval of all pertinent materials and equipment and after receipt of appropriate samples in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.
- C. Contractor shall request priority in writing for any item requiring advance ordering to maintain the approved Construction Schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall deliver manufactured materials in original packages, containers, or bundles (with seals unbroken), bearing name or identification mark of manufacturer.
- B. Contractor shall deliver fabrications in as large assemblies as practicable; where specified as shop-primed or shop-finished, package or crate as required to preserve such priming or finish intact and free from abrasion.

- C. Contractor shall store materials in such a manner as necessary to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt, or from any other cause will not be accepted.
- D. Materials are not acceptable that have been warehoused for long periods of time, stored or transported in improper environment, improperly packaged, inadequately labeled, poorly protected, excessively shipped, deviated from normal distribution pattern, or reassembled.
- E. Contractor shall store material so as to cause no obstructions of sidewalks, roadways, access to the Site or buildings, and underground services. Contractor shall protect material and equipment furnished under Contract.
- F. Contractor may store materials on Site with prior written approval by the District, all material shall remain under Contractor's control and Contractor shall remain liable for any damage to the materials. Should the Project Site not have storage area available, the Contractor shall provide for off-site storage at a bonded warehouse and with appropriate insurance coverage at no cost to District.
- G. When any room in Project is used as a shop or storeroom, the Contractor shall be responsible for any repairs, patching, or cleaning necessary due to that use. Location of storage space shall be subject to prior written approval by District.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers listed in various sections of Contract Documents are names of those manufacturers that are believed to be capable of supplying one or more of items specified therein.
- B. The listing of a manufacturer does not imply that every product of that manufacturer is acceptable as meeting the requirements of the Contract Documents.

2.02 FACILITIES AND EQUIPMENT

Contractor shall provide, install, maintain, and operate a complete and adequate facility for handling, the execution, disposal, and distribution of material and equipment as required for proper and timely performance of Work connected with Contract.

2.03 MATERIAL REFERENCE STANDARDS

Where material is specified solely by reference to "standard specifications" and if requested by District, Contractor shall submit for review data on actual material proposed to be incorporated into Work of Contract listing name and address of vendor, manufacturer, or producer, and trade or brand names of those materials, and data substantiating compliance with standard specifications.

PART 3 - EXECUTION

3.01 WORKMANSHIP

- A. Where not more specifically described in any other Contract Documents, workmanship shall conform to methods and operations of best standards and accepted practices of trade or trades involved and shall include items of fabrication, construction, or installation regularly furnished or required for completion (including finish and for successful operation, as intended).
- B. Work shall be executed by tradespersons skilled in their respective lines of Work. When completed, parts shall have been durably and substantially built and present a neat appearance.

3.02 COORDINATION

- A. Contractor shall coordinate installation of Work so as to not interfere with installation of others. Adjustment or rework because of Contractor's failure to coordinate will be at no additional cost to District.
- B. Contractor shall examine in-place work for readiness, completeness, fitness to be concealed or to receive other work, and in compliance with Contract Documents. Concealing or covering Work constitutes acceptance of additional cost which will result should in-place Work be found unsuitable for receiving other Work or otherwise deviating from the requirements of the Contract Documents.

3.03 COMPLETENESS

Contractor shall provide all portions of the Work, unless clearly stated otherwise, installed complete and operational with all elements, accessories, anchorages, utility connections, etc., in manner to assure well-balanced performance, in accordance with manufacturer's recommendations and by Contract Documents. For example, electric water coolers require water, electricity, and drain services; roof drains require drain system; sinks fit within countertop, etc. Terms such as "installed complete," "operable condition," "for use intended," "connected to all utilities," "terminate with proper cap," "adequately anchored," "patch and refinish," "to match similar," should be assumed to apply in all cases, except where completeness of functional or operable condition is specifically stated as not required.

3.04 APPROVED INSTALLER OR APPLICATOR

Installation by a manufacturer's approved installer or applicator is an understood part of Specifications and only approved installer or applicator is to provide on-site Work where specified manufacturer has on-going program of approving (i.e. certifying, bonding, re-warranting) installers or applicators. Newly established relationships between a manufacturer and an installer or applicator who does not have other approved applicator work in progress or completed is not approved for this Project.

3.05 MANUFACTURER'S RECOMMENDATIONS

All installations shall be in accordance with manufacturer's published recommendations and specific written directions of manufacturer's representative. Should Contract Documents differ from recommendations of manufacturer or directions of his representative, Contractor shall analyze differences, make recommendations to the District and the Architect in writing, and shall not proceed until interpretation or clarification has been issued by the District and/or the Architect.

END OF DOCUMENT

QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections and Tests, Uncovering of Work and Non-conforming of Work and Correction of Work;
- B. Special Conditions.

1.02 RELATED CODES:

- A. The Work is governed by requirements of Title 24, California Code of Regulations ("CCR"), and the Contractor shall keep a copy of these available at the job Site for ready reference during construction.
- B. The Division of the State Architect ("DSA") shall be notified at or before the start of construction.

1.03 OBSERVATION AND SUPERVISION:

- A. The District and Architect or their appointed representatives will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review. Administration by the Architect and any consulting Structural Engineer will be in accordance with applicable regulations, including, without limitation, CCR, Part 1, Title 24, Section 4-341.
- B. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District, referred to hereinafter as the "Project Inspector", will observe the work in accordance with CCR, Part 1, Title 24, Sections 4-333(b) and 4-342:
 - (1) The Project Inspector and Special Inspector(s) shall have access to the Work wherever it is in preparation or progress for ascertaining that the Work is in accordance with the Contract Documents and all applicable code sections. The Contractor shall provide facilities and operation of equipment as needed, and access as required and shall provide assistance for sampling or measuring materials.
 - (2) The Project Inspector will notify the District and Architect and call the attention of the Contractor to any observed failure of Work or material to conform to Contract Documents.

- (3) The Project Inspector shall observe and monitor all testing and inspection activities required.

The Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to CCR, Part 1, Title 24, Section 4-343. The Contractor shall supervise and direct the Work and maintain a competent superintendent on the job who is authorized to act in all matters pertaining to the Work. The Contractor's superintendent shall also inspect all materials, as they arrive, for compliance with the Contract Documents. Contractor shall reject defective Work or materials immediately upon delivery or failure of the Work or material to comply with the Contract Documents. The Contractor shall submit verified reports as indicated in the Contract Documents, including, without limitation, the Specifications and as required by Part 1, Title 24, Section 4-336.

1.04 TESTING AGENCIES:

- A. Testing agencies and tests shall be in conformance with the General Documents and the requirements of Part 1, Title 24, Section 4- 335.
- B. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer, if any, referred to hereinafter as the "Soils Engineer."
- C. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory, referred to hereinafter as the "Testing Laboratory." The Testing Laboratory shall be under direction of an engineer registered in the State of California, shall conform to requirements of ASTM E329, and shall be employed by or in contract with the District.

1.05 TESTS AND INSPECTIONS:

- A. The Contractor shall be responsible for notifying the District and Project Inspector of all required tests and inspections. Contractor shall notify the District and Project Inspector at least seventy-two hours (72) hours in advance of performing any Work requiring testing or inspection.
- B. The Contractor shall provide access to Work to be tested and furnish incidental labor, equipment, and facilities to facilitate all inspections and tests.
- C. The District will pay for first inspections and tests required by the "CCR", and other inspections or tests that the District and/or the Architect may direct to have made, including the following principal items:
 - (1) Tests and observations for earthwork and paving.
 - (2) Tests for concrete mix designs, including tests of trial batches.
 - (3) Tests and inspections for structural steel work.
 - (4) Field tests for framing lumber moisture content.

- (5) Additional tests directed by the District that establish that materials and installation comply with the Contract Documents.
- (6) Tests and observations of welding and expansion anchors.
- D. The District may at its discretion, pay and then back charge the Contractor for:
 - (1) Retests or reinspection, if required, and tests or inspections required due to Contractor error or lack of required identifications of material.
 - (2) Uncovering of work in accordance with Contract Documents.
 - (3) Testing done on weekends, holidays, and overtime will be chargeable to the Contractor for the overtime portion.
 - (4) Testing done off Site.
- E. Testing and inspection reports and certifications:
 - (1) If initially received by Contractor, Contractor shall provide to each of the following a copy of the agency or laboratory report of each test or inspection or certification.
 - (a) The District;
 - (b) The Construction Manager, if any;
 - (c) The Architect;
 - (d) The Consulting Engineer, if any;
 - (e) Other engineers on the Project, as appropriate;
 - (f) The Project Inspector; and
 - (g) The Contractor.
 - (2) When the test or inspection is one required by the CCR, a copy of the report shall also be provided to the DSA.

PART 2 - PRODUCTS

2.01 TYPE OF TESTS AND INSPECTIONS

- A. Testing and inspection shall be in accordance with DSA Form 103 (or current version)
- B. Slump Test
ASTM C 143

C. Concrete Tests

Testing agency shall test concrete used in the work per the following paragraphs:

(1) Compressive Strength:

- (a) Minimum number of tests required: One (1) set of three (3) cylinders for each 50 cubic yards or 2000 sqft of concrete or major fraction thereof, placed in one (1) day. See ASTM C31
- (b) Two cylinders of each set shall be tested at twenty-eight (28) days. One (1) cylinder shall be held in reserve and tested only when directed by the Architect or District.
- (c) Concrete shall test the minimum ultimate compressive strength in twenty-eight 28 days, as specified on the structural drawings.
- (d) In the event that the twenty-eight (28) day test falls below the minimum specified strength, the effective concrete in place shall be tested by taking cores in accordance with ACI 318, MM Test Method 227 (Coarse Aggregates) and MM Test Method 217 (Fine Aggregates), and tested as required for cylinders.
- (e) In the event that the test on core specimens falls below the minimum specified strength, the concrete will be deemed defective and shall be removed and replaced upon such direction of the Architect, and in a manner acceptable to the Division of the State Architect.

D. Reinforcing, Steel

E. Structural Steel as noted:

- (1) Material: Steel per Section 03 20 00
- (2) Qualification of Welders (AWS D1.4).
- (3) Shop fabrication (ACI 318 Structural steel only).
- (4) Shop and field welding (AWS D1.4)

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Site Standards; and
- D. Construction Waste Management and Disposal.

1.02 TEMPORARY UTILITIES:

- A. Electric Power and Lighting:
 - (1) Contractor will pay for power during the course of the Work. To the extent power is available in the building(s) or on the Site, Contractor may use the District’s existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver that power service from its existing location in the building(s) or on the Site to point of intended use.
 - (2) Contractor shall verify characteristics of power available in building(s) or on the Site. Contractor shall take all actions required to make modifications where power of higher voltage or different phases of current are required. Contractor shall be fully responsible for providing that service and shall pay all costs required therefor.
 - (3) Contractor shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.
 - (4) Contractor shall be responsible for maintaining existing lighting levels in the project vicinity should temporary outages or service interruptions occur.
- B. Heat and Ventilation:

- (1) Contractor shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation and curing of materials, and to protect materials and finishes from damage due to improper temperature and humidity conditions. Portable heaters shall be standard units complete with controls.
- (2) Contractor shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.
- (3) Contractor shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.

C. Water:

- (1) Contractor shall pay for water used during the course of the Work. Contractor shall coordinate and pay for installation or use of water meter in compliance with local water agency requirements. To the extent water is then available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver such utility service from its existing location in the building(s), on the Site, or other location approved by the local water agency, to point of intended use.
- (2) Contractor shall use backflow preventers on water lines at point of connection to District's water supply. Backflow preventers shall comply with requirements of Uniform Plumbing Code.
- (3) Contractor shall make potable water available for human consumption.

D. Sanitary Facilities:

- (1) Contractor shall provide sanitary temporary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Inspector or Contractor completes all other work at the Site.
- (2) Use of toilet facilities in the Work under construction shall not be permitted except by consent of the Inspector and the District.

E. Telephone Service:

- (1) Contractor shall arrange with local telephone service company for telephone service as required for the performance of the Work.

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Contractor shall, at a minimum, provide in its field office one line for telephone and one line for fax machine.

- (2) Contractor shall pay the costs for telephone and fax lines installation, maintenance, service, and removal.

F. Fire Protection:

- (1) Contractor shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California Fire, State Fire Marshall and/or its designee.
- (2) Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection for adjacent surfaces.

G. Trash Removal:

- (1) Contractor shall provide trash removal on a timely basis. Under no circumstance shall Contractor use District trash service.

H. Field Office:

- (1) If Contractor chooses to provide a field office, it shall be an acceptable construction trailer that is well-lit and ventilated. The construction trailer shall be equipped with shelves, desks, filing cabinet, chairs, and such other items of equipment needed. Trailer and equipment are the property of the Contractor and must be removed from the Site upon completion of the Work. Contractor may use the corridor adjacent to the construction area for an office area, if approved in writing by District.
- (2) Contractor shall provide any additional electric lighting and power required for the trailer. Contractor shall make adequate provisions for heating and cooling as required.

I. Temporary Facilities:

- (1)

1.03 CONSTRUCTION AIDS:

A. Plant and Equipment:

- (1) Contractor shall furnish, operate, and maintain a complete plant for fabricating, handling, conveying, installing, and erecting materials and equipment; and for conveyances for transporting workers. Include elevators, hoists, debris chutes, and other equipment, tools, and appliances necessary for performance of the Work.

- (2) Contractor shall maintain plant and equipment in safe and efficient operating condition. Damages due to defective plant and equipment, and uses made thereof, shall be repaired by Contractor at no expense to the District.
- B. None of the District's tools and equipment shall be used by Contractor for the performance of the Work.

1.04 BARRIERS AND ENCLOSURES:

- A. Contractor shall obtain the District's written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.
- B. Contractor shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises, the public, and workers. Contractor shall also protect the Work and existing facilities from the elements, and adjacent construction and improvements, persons, and trees and plants from damage and injury from demolition and construction operations.
- C. Contractor shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.
- D. Tree and Plant Protection:
- (1) Contractor shall preserve and protect existing trees and plants on the Premises that are not designated or required to be removed, and those adjacent to the Premises.
 - (2) Contractor shall provide barriers to a minimum height of 4'-0" around drip line of each tree and plant, around each group of trees and plants, as applicable, in the proximity of demolition and construction operations, or as denoted on the Plans.
 - (3) Contractor shall not park trucks, store materials, perform Work or cross over landscaped areas. Contractor shall not dispose of paint thinners, water from cleaning, plastering or concrete operations, or other deleterious materials in landscaped areas, storm drain systems, or sewers. Plant materials damaged as a result of the performance of the Work shall, at the option of the District and at Contractor's expense, either be replaced with new plant materials equal in size to those damaged or by payment of an amount representing the value of the damaged materials as determined by the District.
 - (4) Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.

- (5) Excavation around Trees:
- (a) Excavation within drip lines of trees shall be done only where absolutely necessary and with written permission from the District.
 - (b) Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging and shall be approved by the District. Main lateral roots and taproots shall not be cut. All roots 2 inches in diameter and larger shall be tunneled under and heavily wrapped with wet burlap so as to prevent scarring or excessive drying. Smaller roots that interfere with installation of new work may be cut with prior approval by the District. Roots must first be cut with a Vermeer, or equivalent, root cutter prior to any trenching.
 - (c) Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If encountered immediately adjacent to location of new construction, roots shall be cut approximately 6 inches back from new construction.
 - (d) Approved excavations shall be carefully backfilled with the excavated materials approved for backfilling. Backfill shall conform to adjacent grades without dips, sunken areas, humps, or other surface irregularities. Do not use mechanical equipment to compact backfill. Tamp carefully using hand tools, refilling and tamping until Final Acceptance as necessary to offset settlement.
 - (e) Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be wrapped with four layers of wet, untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.
 - (f) Accidentally broken roots should be sawed cleanly 3 inches behind ragged end.

1.05 SECURITY:

The Contractor shall be responsible for project security for materials, tools, equipment, supplies, and completed and partially completed Work.

1.06 TEMPORARY CONTROLS:

A. Noise Control:

- (1) Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work period, and it shall take

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all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.

- (2) Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other equipment, shall be submitted to the District a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration:

- (1) Equipment and impact tools shall have intake and exhaust mufflers.
- (2) Contractor shall cooperate with District to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt:

- (1) Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.
- (2) Contractor shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.
- (3) Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.
- (4) Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water:

- (1) Contractor shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Contractor shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution:

- (1) No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.

- (2) Contractor shall comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting:

- (1) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

1.07 JOB SIGN(S):

A. General:

- (1) Contractor shall provide and maintain a Project identification sign with the design, text, and colors designated by the District and/or the Design Professional; locate sign as approved by the District.
- (2) Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the District.

B. Materials:

- (1) Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.
- (2) Sign Surface: Minimum 3/4-inch exterior grade plywood.
- (3) Rough Hardware: Galvanized.
- (4) Paint: Exterior quality, of type and colors selected by the District and/or the Design Professional.

C. Fabrication:

- (1) Contractor shall fabricate to provide smooth, even surface for painting.
- (2) Size: 4'-0" x 8'-0", unless otherwise indicated.
- (3) Contractor shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.
- (4) Text and Graphics: As indicated.

1.08 PUBLICITY RELEASES:

- A. Contractor shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s) without the written permission of the District.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF DOCUMENT

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

- A. Administrative and procedural requirements for the following:
 - (1) Salvaging non-hazardous construction waste.
 - (2) Recycling non-hazardous construction waste.
 - (3) Disposing of non-hazardous construction waste.

1.03 DEFINITIONS:

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS:

- A. General: Develop waste management plan that results in end-of Project rates for salvage/recycling of eighty five percent (85%) by weight (or by volume, but not a combination) of total waste generated by the Work.

1.05 SUBMITTALS:

- A. Waste Management Plan: Submit waste management plan within 30 days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:
 - (1) Material category.
 - (2) Generation point of waste.
 - (3) Total quantity of waste in tons or cubic yards.
 - (4) Quantity of waste salvaged, both estimated and actual in tons or cubic yards.
 - (5) Quantity of waste recycled, both estimated and actual in tons or cubic yards.
 - (6) Total quantity of waste recovered (salvaged plus recycled) in tons or cubic yards.
 - (7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for final payment, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

- H. CHPS Submittal: CHPS letter template for Credit ME2.0 and ME2.1, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- I. Qualification Data: For Waste Management Coordinator.
- J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- K. Submittal procedures and quantities are specified in Document 01 33 00.

1.06 QUALITY ASSURANCE:

- A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to waste management including, but not limited to, the following:
 - (1) Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - (2) Review requirements for documenting quantities of each type of waste and its disposition.
 - (3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - (4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - (5) Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN:

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measurement throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

01 50 13 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
- (1) Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - (2) Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - (3) Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - (4) Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - (5) Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - (6) Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION:

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- (1) Comply with Document 01 50 00 for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - (1) Distribute waste management plan to everyone concerned within 3 days of submittal return.
 - (2) Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.

- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - (1) Designate and label specific areas of Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - (2) Comply with Document 01 50 00 for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE:

- A. General: Recycle paper and beverage containers used by on-site workers.

- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.

- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - (1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.
 - (a) Inspect containers and bins for contamination and remove contaminated materials if found.
 - (2) Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - (3) Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - (4) Store components off the ground and protect from the weather.

- (5) Remove recyclable waste off District property and transport to recycling receiver or processor.
- D. Packaging:
- (1) Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - (2) Polystyrene Packaging: Separate and bag material.
 - (3) Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on Site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - (4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- E. Site-Clearing Wastes: Chip brush, branches, and trees on site.
- F. Wood Materials:
- (1) Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - (2) Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
- (1) Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.03 DISPOSAL OF WASTE:

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
- (1) Except as otherwise specified, do not allow waste materials that are to be disposed of 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 waste materials.
- C. Disposal: Transport waste materials off District property and legally dispose of them.

END OF SECTION

01 50 13 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FIELD OFFICES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

- A. Requirements for Field Offices and Field Office Trailers.

1.03 SUMMARY:

- A. General: Contractor shall provide District's Field Office Trailer and contents, for District's use exclusively, during the term of the Contract.
- B. Property: Trailer, furniture, furnishings, equipment, and the like, supplied by the Contractor with the Office Trailer shall remain the property of the Contractor; District property items installed, delivered, and the like by District within the Office Trailer will remain District's property.
- C. Modifications: District reserves the right to modify the trailer or contents, or both, as may be deemed proper by District.
- D. Condition: Trailer and contents shall be clean, neat, substantially finished, in good, proper, and safe condition for use, operation, and the like; the trailer and contents shall not be required to be new.
- E. Installation Timing: Provide safe, fully furnished, functional, proper, complete, and finished trailer properly ready for entire use, within fourteen (14) calendar days of District's notification of the issuance of Notice to Proceed.

1.04 SUBMITTALS:

- A. General: Submit submittals to District in quantity, format, type, and the like, as specified herein.

- B. Office Trailer Data: One (1) copy of manufacturer’s descriptive data, technical descriptions, regulatory compliance, industry standards, installation, removal, and maintenance instructions.
- C. Equipment Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.
- D. Furniture and Furnishings Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.
- E. Plans: One (1) reproducible copy of appropriately scaled plans of trailer layout. Plans shall include, but not be limited to: lighting; furniture; equipment; telephone and electrical outlets; and the like.
- F. Product Samples: One (1) complete and entire unit of each type, if directed by District.

1.05 QUALITY ASSURANCE

- A. Standards: In the event that provisions of codes, regulations, safety orders, Contract Documents, referenced manufacturer’s specifications, manufacturer’s instructions, industry standards, and the like, are in conflict, the more restrictive and higher quality shall govern.
- B. Installer: Installer or Installers engaged by Contractor must have a minimum of five (5) years of documented and properly authenticated successful experience of specialization in the installation of the items or systems, or both, specified herein.
- C. Manufacturer: Contractor shall obtain products from nationally and industry recognized Manufacturer with five (5) years minimum, of immediately recent, continuous, documented and properly authenticated successful experience of specialization in the manufacture of the product specified herein.
- D. State Personnel Training: Provide proper training for maintenance and operations, including emergency procedures, and the like, as directed by District.
- E. Units: Shall be sound and free of defects, and shall not include any damage or defect that will impair the safety, installation, performance, or the durability of the entire Office Trailer and appurtenant systems.

1.06 REGULATORY REQUIREMENTS

- A. General: Work shall be executed in accordance with applicable Codes, Regulations, Statutes, Enactments, Rulings, Laws, each authority having jurisdiction, and including, but not limited to, Regulatory Requirements specified herein.
- B. California Building Standards Code (“CBSC”).

- C. California Code of Regulations, Title 25, Chapter 3, Sub Chapter 2, Article 3 (“CCR”).
- D. Coach Insignia: Trailer shall display California Commercial Coach Insignia; such insignia shall be deemed to show that the trailer is in accordance with the Construction and Fire Safety requirements of CCR.

PART 2 – PRODUCTS

2.01 FIELD OFFICE TRAILER

- A. General: Provide entire Field Office Trailer of type, function, operation, capacity, size, complete with controls, safety devices, accessories, and the like, for proper and durable installation. Partitions, walls, ceiling, and other interior and exterior surfaces shall be appropriately finished, including, but not limited to, trim, painting, wall base, floor covering, suspended or similar ceiling, and the like; provide systems, components, units, nuts, bolts, screws, anchoring devices, fastening devices, washers, accessories, adhesives, sealants, and other items of type, grade, and class required for the particular use, not identified but required for a complete, weather-tight, appropriately operating, and finished installation.
- B. Manufacturers: General Electric Capital Modular Space; The Space Place, Inc.; or equal.
- C. Program: Provide a wheel-mounted trailer with stairs, landings, platforms, ramps, and the like, in good, proper, safe, clean, and properly finished condition; with proper heavy duty locks, and other proper and effective security at all doors, windows, and the like. Trailer shall be maintained in good, proper, safe, clean, and properly finished condition during the Contract.
 - (1) Nominal Trailer Size: Four hundred eighty (480) square feet, minimum.
 - (2) Stairs, Platform: Properly finished stairs, platforms, and ramps.
 - (3) Doors: Two (2), three (3) foot wide exterior doors with locksets; finished ramp, steps, and entry platform at each exterior door.
 - (4) Keys: Submit five (5) keys for each door, window, furniture unit, and the like. There shall be no other key copies or originals available; each key shall be identified for District; and shall be labeled, or tagged or both, as directed by District.
 - (5) HVAC:
 - (6) Lighting: Sixty-five (65) foot-candles illumination minimum at any point, at thirty (30) inches above finished floor throughout from fluorescent light source, exclusively, or as directed by District.

- (7) Electrical Outlets: One (1) duplex outlet evenly spaced every twelve (12) linear horizontal feet of wall face, and electrical service ready for use.
- (8) Telephones and Telephone Outlets: Two (2) telephone lines wired, connected to telephone utility service, and ready for use, and two (2) telephone instruments, each with two (2)-line capability, speed dial and hands-free feature. Locate each outlet as directed by District.
- (9) Voicemail Messaging System or Answering Machine: One (1) unit, two (2)-line; digital.

2.02 FIELD OFFICE TRAILER ITEMS

- A. General: Provide the Field Office Trailer with the following arranged into two (2) workstations:
 - (1) Desks: Two (2) desks: thirty-six (36) inches by sixty (60) inches; steel, laminated plastic top; locking, one (1) or two (2) file drawers single pedestal; steel; provide five (5) keys to District.
 - (2) Tables: Two (2) tables; thirty-six (36) inches by sixty (60) inches; twenty-nine (29) inches high; steel, laminated plastic top tables; one (1) at each desk.
 - (3) Chairs: Two (2) chairs: swivel; steel; with seat cushion and arms; one (1) at each desk.
 - (4) Waste Baskets: Two (2) waste baskets, one at each desk.
- B. Furniture and Equipment: Provide in the space located to effect efficient and logical use.
 - (1) File cabinet: One (1); four (4) drawer; lateral; steel locking.
 - (2) Plan Table: One (1) plan table: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawers.
 - (3) Drafting Stool: One (1) drafting stool; swiveling; steel; padded; adjustable; with footrest and casters.
 - (4) Bookshelf: One (1) bookshelf: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawer.
 - (5) Plan Rack: One (1) wheel mounted plan rack.
 - (6) Waste Baskets: One (1) large waste basket.

- (7) Coat/Hat Hanger: Wall mounted with minimum capacity for four (4) garments and ten (10) hats.
- (8) Document Management System: Shall include an integrated high-volume printer, copier, and facsimile machine, including stand, base, and storage cabinet; and shall include the following features:
 - (a) Type: Laser, dry electrostatic transfer, plain paper, digital, multi-function imaging system.
 - (b) Network: Ethernet or Token Ring network ready, Plug-and-Play.
 - (c) Print, send/receive facsimile from any connected workstation.
 - (d) Resolution: Six hundred (600) dots per inch by six hundred (600) dots per inch, minimum.
 - (e) Print Speed: Twenty (20) pages per minute, minimum.
 - (f) Copies: Twenty (20) copies per minute, minimum.
 - (g) Document Handler: Forty (40) sheet, minimum
 - (h) Collator: Forty (40) bin, minimum, with stapling.
 - (i) Duplexing: Capable.
 - (j) Paper Size: Capable of handling paper sizes to eleven (11) inches by seventeen (17) inches.
 - (k) Paper Cassettes: One (1) each for eight and one half (8.5) inches by eleven (11) inches, eight and one half (8.5) inches by fourteen (14) inches, and eleven (11) inches by seventeen (17) inches paper sizes; minimum two hundred fifty (250) sheets per cassette.
 - (l) Reduction/Enlargement: Capable of reduction to twenty-five percent (25%) and enlargement to two hundred percent (200%).
 - (m) Facsimile Electronic Storage: Capable of storing minimum of fifty (50) speed dial numbers, group faxing and broadcast faxing.
 - (n) Facsimile Scanning: Capable of scanning into memory a minimum of one hundred (100) pages with maximum scan time of three (3) seconds per page.
 - (o) Halftone: Sixty-four (64) levels.

- (p) Redial: Automatic and Manual.
- (9) Maintenance: Contractor shall purchase service agreements for each unit of equipment for the duration of the project plus two (2) months, and shall maintain all equipment in proper working condition. Service agreements shall include provision for replacement of toner cartridges and other items required to effect proper unit use. Service agreements shall also provide for:
 - (a) Unlimited Service Calls.
 - (b) Same Day Response.
 - (c) All parts, labor, preventative maintenance and mileage.
 - (d) All chemicals, such as toner, fixing agent, and the like.
 - (e) System training and setup.
- (10) Portable Toilets: Two (2); each shall include a urinal; each unit shall be a properly enclosed chemical unit conforming to ANSI Z4.3.
 - (a) Location: As directed by District.
 - (b) Maintenance: Maintain each unit and surrounding areas in a clean, hygienic and orderly manner, at all time. Empty, clean, and sanitize each unit each day at a location and time as directed by District.
 - (c) Removal: Relocate, or remove from the site, each Portable Toilet. Upon such directive by District, the Contractor shall forthwith relocate or remove each Portable Toilet and submit the affected areas to a condition which existed prior to the installation of each Portable Toilet, within three (3) calendar days, or as directed by District in writing, at no cost to District.

2.03 UTILITY AND SERVICES

- A. Telephone Service: Contractor shall provide and interface the entire telephone service, and shall properly and timely pay for telephone service for District's non-long-distance use.
- B. Electrical Service: Provide all proper connections and continuously pay for service for the duration of the Work.

2.04 FINISHES

- A. General: Manufacturer standard finish system over surfaces properly cleaned, pretreated, and prepared to obtain proper bond; all visible surfaces shall be coated.

- B. Finish: Color as selected by District from manufacturer standard palette.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General: Properly prepare area and affected items to receive the Work. Set Work accurately in location, alignment, and elevation; rigidly, securely, and firmly anchor to appropriate structure; install plumb, straight, square, level, true, without racking, rigidly anchored to proper solid blocking, substrate, and the like; provide appropriate type and quantity of reinforcements, fasteners, adhesives, self-adhesive and other tapes; lubricants, coatings, accessories, and the like, as required for a complete, structurally rigid, stable, sound, and appropriately finished installation, in accordance with manufacturer's published instructions, and as indicated. The more restrictive and higher quality requirement shall govern. Moving parts shall be properly secured, without binding, looseness, noise, and the like.
- B. Installation: Install in accordance with 25 CCR 3.2.3 and as directed by District; jack up trailer and level both ways; mount on proper concrete piers with all load off wheels; provide required tie down and accessories per Section 4368 of referenced CCR, and as directed by District.
- C. Rejected Work: Work, materials, unit, items, systems, and the like, not accepted by District shall be deemed rejected, and shall forthwith be removed and replaced with proper and new Work, materials, unit, items, systems, and the like at no cost to District.
- D. Standard: Comply with manufacturer's published instructions, or with instructions as shown or indicated; the more restrictive and higher quality requirement shall govern.
- E. Location: As directed by District.
- F. Fire Resistance: Construct and install in accordance with UL requirements.
- G. Maintenance: Contractor shall maintain trailer and adjacent areas in a safe, clean and hygienic condition throughout the duration of the Work, and as directed by District. Properly repair or replace furniture or other items, as directed by District. Properly remove unsafe, damaged, or broken furniture, or similar items, and replace with safe and proper items. Contractor shall pay cost of all services, repair, and maintenance, or replacement of each item.
- H. Janitorial Service: Provide professional janitorial services, including, but not limited to, trash, waste paper baskets, fill paper dispensers; clean and dust all furniture, files, and the like; sweep and mop resilient and similar flooring; and vacuum carpeting and similar flooring.
 - (1) Frequency: Two (2) times per week, minimum.

- I. Removal: Properly remove the Office Trailer and contents from the Site upon completion of the Contract, or as directed by District in writing. Forthwith properly patch and repair affected areas; replace damaged items with new items. Carefully and properly inventory, clean, pack, store, and protect District property; submit District property to District at a date, time and location as directed by District.

END OF DOCUMENT

OWNER-FURNISHED PRODUCTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Materials and Equipment.

1.02 SECTION INCLUDES

- A. Requirements for the following:
 - (1) Installing Owner-furnished materials and equipment.
 - (2) Providing necessary utilities, connections and rough-ins.

1.03 DEFINITIONS

- A. Owner: District, who is providing/furnishing materials and equipment.
- B. Installing Contactor: Contractor, who is installing the materials and equipment furnished by the Owner.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Receive, store and handle products in accordance with the manufacturer’s instructions.
- B. Protect equipment items as required to prevent damage during storage and construction.

PART 2 – PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Installing Contractor’s Responsibilities:
 - (1) Verify mounting and utility requirements for Owner-furnished materials and equipment items.
 - (2) Provide mounting and utility rough in for all items where required.

- (a) Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.

B. Owner and Installing Contractor(s) Responsibilities:

- (1) Owner-Furnished/Contractor Installed ("OFCI"): Furnished by the Owner; installed by the Installing Contractor.
 - (a) General: Owner and Installing Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.
 - (b) Owner will furnish specified materials and equipment delivered to the site. Owner/vendor's representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 43 00, Materials and Equipment, Article 1.04.
 - (c) The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installing Contractor.
 - (d) The Installing Contractor shall:
 - 1) Review, verify and accept the approved manufacturer's submittal/Shop Drawings for all materials and equipment required to be installed by the Installer Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.
 - 2) Coordinate timely delivery. Installing Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installing Contractor shall assume responsibility for such defects and omissions.
 - 3) Store materials and equipment until ready for installation and protect from loss and damage. Installing Contractor is responsible for providing adequate storage space.
 - 4) Coordinate with other bid package contractors and field measurement to ensure complete installation.
 - 5) Uncrate, assemble, and set in place.
 - 6) Provide adequate supports.

- 7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and Shop Drawings, supply labor and material required, and make mechanical, plumbing, and electrical connections required to operate equipment.
- 8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.
- 9) Provide anchorage and/or bracing as required for seismic restraint per Title 24, UBC Standard 27-11 and all other applicable codes.
- 10) Provide the contract-required warranty and guarantee for all work, materials and equipment, and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.

C. Compatibility with Space and Service Requirements:

- (1) Equipment items shall be compatible with space limitations indicated and as shown on the Contract Documents and specified in other sections of the Specifications.
- (2) Modifications to equipment items required to conform to space limitations specified for rough in shall not cause additional cost to the District.

D. Manufacturer's printed descriptions, specifications, and instructions shall govern the Work unless specifically indicated or specified otherwise.

2.02 FURNISHED MATERIALS AND EQUIPMENT

- A. All furnished materials and equipment are indicated or scheduled on the Contract Documents.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install equipment items in accordance with the manufacturer's instructions.
- B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.
- C. Make electrical and mechanical connections as indicated and required.
- D. Touch-up and restore damaged or defaced finishes to the Owner's satisfaction.

3.02 CLEANING AND PROTECTION

- A. Repair or replace items not acceptable to the Architect or Owner.
- B. Upon completion of installation, clean equipment items in accordance with manufacturer's recommendations, and protect from damage until final acceptance of the Work by the Owner.

END OF DOCUMENT

SECTION 01 66 00

PRODUCT DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access, Conditions and Requirements;
- B. Special Conditions.

1.02 PRODUCTS

- A. Products are as defined in the General Conditions.
- B. Contractor shall not use and/or reuse materials and/or equipment removed from existing Premises, except as specifically permitted by the Contract Documents.
- C. Contractor shall provide interchangeable components of the same manufacturer, for similar components.

1.03 TRANSPORTATION AND HANDLING

- A. Contractor shall transport and handle Products in accordance with manufacturer's instructions.
- B. Contractor shall promptly inspect shipments to confirm that Products comply with requirements, quantities are correct, and products are undamaged.
- C. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

- A. Contractor shall store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Contractor shall store sensitive products in weather-tight, climate-controlled enclosures.
- B. For exterior storage of fabricated Products, Contractor shall place on sloped supports, above ground.
- C. Contractor shall provide off-site storage and protection when Site does not permit on-site storage or protection.

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- D. Contractor shall cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.
- E. Contractor shall store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.
- F. Contractor shall provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- G. Contractor shall arrange storage of Products to permit access for inspection and periodically inspect to assure Products are undamaged and are maintained under specified conditions.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

FIELD ENGINEERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;
- B. Special Conditions;
- C. Site-Visit Certification.

1.02 REQUIREMENTS INCLUDED:

- A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:
 - (1) Survey work required in execution of the Project.
 - (2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:

Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

1.04 SURVEY REFERENCE POINTS:

- A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.
- B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:
 - (1) Make no changes or relocation without prior written notice to District and Architect.
 - (2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

- (3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

1.05 RECORDS:

Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

1.06 SUBMITTALS:

- A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.
- B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.
- C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 COMPLIANCE WITH LAWS:

Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

3.02 NONCONFORMING WORK:

Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF DOCUMENT

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;
- B. Special Conditions;
- C. Hazardous Materials Procedures and Requirements;
- D. Hazardous Materials Certification;
- E. Lead-Based Paint Certification;
- F. Imported Materials Certification.

1.02 CUTTING AND PATCHING:

- A. Contractor shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:
 - (1) Make several parts fit together properly.
 - (2) Uncover portions of Work to provide for installation of ill-timed Work.
 - (3) Remove and replace defective Work.
 - (4) Remove and replace Work not conforming to requirements of Contract Documents.
 - (5) Remove Samples of installed Work as specified for testing.
 - (6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.
 - (7) Attaching new materials to existing remodeling areas – including painting (or other finishes) to match existing conditions.
- B. In addition to Contract requirements, upon written instructions from the District, Contractor shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of

installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.

- C. Contractor shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

1.03 SUBMITTALS:

- A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Contractor shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:
 - (1) The work of the District or other trades.
 - (2) Structural value or integrity of any element of Project.
 - (3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.
 - (4) Efficiency, operational life, maintenance or safety of operational elements.
 - (5) Visual qualities of sight-exposed elements.
- B. Contractor's Request shall also include:
 - (1) Identification of Project.
 - (2) Description of affected Work.
 - (3) Necessity for cutting, alteration, or excavations.
 - (4) Effects of Work on District, other trades, or structural or weatherproof integrity of Project.
 - (5) Description of proposed Work:
 - (a) Scope of cutting, patching, alteration, or excavation.
 - (b) Trades that will execute Work.
 - (c) Products proposed to be used.
 - (d) Extent of refinishing to be done.
 - (6) Alternates to cutting and patching.
 - (7) Cost proposal, when applicable.

- (8) The scheduled date the Contractor intends to perform the Work and the duration of time to complete the Work.
- (9) Written permission of District or other District contractor(s) whose work will be affected.

1.04 QUALITY ASSURANCE:

- A. Contractor shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.
- B. Contractor shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

1.05 PAYMENT FOR COSTS:

- A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Contractor and/or deducted from the Contract by the District.
- B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval of written Change Order. Contractor shall provide written cost proposals prior to proceeding with cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Contractor shall provide for replacement and restoration of Work removed. Contractor shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Contractor shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.
- B. Materials to be cut and patched include those damaged by the performance of the Work.

PART 3 – EXECUTION

3.01 INSPECTION:

- A. Contractor shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Contractor shall inspect conditions affecting installation of new products.
- B. Contractor shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

3.02 PREPARATION:

- A. Contractor shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.
- B. Contractor shall provide devices and methods to protect other portions of Project from damage.
- C. Contractor shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that may be exposed by cutting and patching Work. Contractor shall keep excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION:

- A. With respect to performance, Contractor shall:
 - (1) Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.
 - (2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.
 - (3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage from settlement.
- B. Contractor shall employ original installer or fabricator to perform cutting and patching for:
 - (1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.
 - (2) Sight-exposed finished surfaces.
- C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances,

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and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.

- D. Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Contractor shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Contractor shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.
- E. Contractor shall restore Work which has been cut or removed. Contractor shall install new products to provide completed Work in accordance with requirements of the Contract Documents and as required to match surrounding areas and surfaces.
- F. Contractor shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

END OF DOCUMENT

ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;
- B. Special Conditions.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK:

- A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Contractor shall match existing products, conditions, and work for patching and extending work.
- B. Type and Quality of Existing Products: Contractor shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Contractor shall verify that demolition is complete and that areas are ready for installation of new Work.
- B. By beginning restoration Work, Contractor acknowledges and accepts the existing conditions.

3.02 PREPARATION:

- A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Contractor shall replace and restore these at completion.
- B. Contractor shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Contractor shall replace materials as specified for finished Work.

- C. Contractor shall remove debris and abandoned items from all areas of the Site and from concealed spaces.
- D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.
- E. Contractor shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Contractor shall insulate ductwork and piping to prevent condensation in exposed areas. Contractor shall insulate building cavities for thermal and/or acoustical protection, as detailed.

3.03 INSTALLATION:

- A. Contractor shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.
- B. Designated Areas and Finishes: Contractor shall complete all installations in all respects, including operational, mechanical work and electrical work.
- C. Contractor shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.
- D. Contractor shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat and square or straight transition to adjacent finishes.
- E. Contractor shall install products as specified in the Contract Documents, including without limitation, the Specifications.

3.04 TRANSITIONS:

- A. Where new Work abuts or aligns with existing, Contractor shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Contractor shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

3.05 ADJUSTMENTS:

- A. Where removal of partitions or walls results in adjacent spaces becoming one, Contractor shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
- B. Where a change of plane of 1/4 inch or more occurs, Contractor shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.

- C. Contractor shall trim and seal existing wood doors and shall trim and paint metal doors as necessary to clear new floor finish and refinish trim as required.
- D. Contractor shall fit Work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES:

- A. Contractor shall patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections, in the area where the Work is performed.
- B. Contractor shall repair substrate prior to patching finish.

3.07 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS:

- A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored by Contractor to their original condition or better, where indicated.
- B. Contractor shall protect and replace, if damaged, all existing guard posts, barricades, and fences.
- C. Contractor shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified in the Contract Documents, including without limitation, the Drawings.

3.08 FINISHES:

- A. Contractor shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.
- B. Contractor shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Contractor shall refinish entire surface to nearest intersections.

3.09 CLEANING:

- A. Contractor shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF DOCUMENT

CONTRACT CLOSEOUT AND FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of Work;
- B. Special Conditions;
- C. Temporary Facilities and Controls.

1.02 CLOSEOUT PROCEDURES

Contractor shall comply with all closeout provisions as indicated in the General Conditions.

1.03 FINAL CLEANING

- A. Contractor shall execute final cleaning prior to final inspection.
- B. Contractor shall clean interior and exterior glass and all surfaces exposed to view; remove temporary labels, tape, stains, and foreign substances, polish transparent and glossy surfaces, wax and polish new vinyl floor surfaces, vacuum carpeted and soft surfaces.
- C. Contractor shall clean equipment and fixtures to a sanitary condition.
- D. Contractor shall replace filters of operating equipment.
- E. Contractor shall clean debris from roofs, gutters, down spouts, and drainage systems.
- F. Contractor shall clean Site, sweep paved areas, and rake clean landscaped surfaces.
- G. Contractor shall remove waste and surplus materials, rubbish, and construction facilities from the Site and surrounding areas.

1.04 ADJUSTING

Contractor shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 RECORD DOCUMENTS AND SHOP DRAWINGS

- A. Contractor shall legibly mark each item to record actual construction, including:
 - (1) Measured depths of foundation in relation to finish floor datum.
 - (2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permit surface improvements.
 - (3) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - (4) Field changes of dimension and detail.
 - (5) Details not on original Contract Drawings
 - (6) Changes made by modification(s).
 - (7) References to related Shop Drawings and modifications.
- B. Contractor will provide one set of Record Drawings to District.
- C. Contractor shall submit all required documents to District and/or Architect prior to or with its final Application for Payment.

1.06 INSTRUCTION OF DISTRICT PERSONNEL

- A. Before final inspection, at agreed upon times, Contractor shall instruct District's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. For equipment requiring seasonal operation, Contractor shall perform instructions for other seasons within six months or by the change of season.
- C. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Contractor shall prepare and insert additional data in Operation and Maintenance Manual when the need for such data becomes apparent during instruction.
- E. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Contractor shall provide products, spare parts, maintenance, and extra materials in quantities specified in the Specifications and in Manufacturer's recommendations.

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- B. Contractor shall provide District with all required Operation and Maintenance Data at one time. Partial or piecemeal submissions of Operation and Maintenance Data will not be accepted.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of the Work;
- B. Special Conditions.

1.02 QUALITY ASSURANCE:

Contractor shall prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT:

- A. Contractor shall prepare data in the form of an instructional manual entitled "OPERATIONS AND MAINTENANCE MANUAL & INSTRUCTIONS" ("Manual").
- B. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size. When multiple binders are used, Contractor shall correlate data into related consistent groupings.
- C. Cover: Contractor shall identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL & INSTRUCTIONS"; and shall list title of Project and identify subject matter of contents.
- D. Contractor shall arrange content by systems process flow under section numbers and sequence of Table of Contents of the Contract Documents.
- E. Contractor shall provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: The content shall include Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Contractor shall provide with reinforced punched binder tab and shall bind in with text; folding larger drawings to size of text pages.

1.04 CONTENTS, EACH VOLUME:

- A. Table of Contents: Contractor shall provide title of Project; names, addresses, and telephone numbers of the Architect, any engineers, subconsultants,

Subcontractor(s), and Contractor with name of responsible parties; and schedule of products and systems, indexed to content of the volume.

- B. For Each Product or System: Contractor shall list names, addresses, and telephone numbers of Subcontractor(s) and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Contractor shall mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Contractor shall supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Contractor shall not use Project Record Documents as maintenance drawings.
- E. Text: Contractor shall include any and all information as required to supplement product data. Contractor shall provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- F. Warranties and Bonds: Contractor shall bind in one copy of each.

1.05 MANUAL FOR MATERIALS AND FINISHES:

- A. Building Products, Applied Materials, and Finishes: Contractor shall include product data, with catalog number, size, composition, and color and texture designations. Contractor shall provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Contractor shall include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Contractor shall include product data listing applicable reference standards, chemical composition, and details of installation. Contractor shall provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: Contractor shall include all additional requirements as specified in the Specifications.
- E. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS:

- A. Each Item of Equipment and Each System: Contractor shall include description of unit or system, and component parts and identify function, normal operating characteristics, and limiting conditions. Contractor shall

include performance curves, with engineering data and tests, and complete nomenclature, and commercial number of replaceable parts.

- B. Panelboard Circuit Directories: Contractor shall provide electrical service characteristics, controls, and communications.
- C. Contractor shall include color coded wiring diagrams as installed.
- D. Operating Procedures: Contractor shall include start-up, break-in, and routine normal operating instructions and sequences. Contractor shall include regulation, control, stopping, shut-down, and emergency instructions. Contractor shall include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Contractor shall include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Contractor shall provide servicing and lubrication schedule, and list of lubricants required.
- G. Contractor shall include manufacturer's printed operation and maintenance instructions.
- H. Contractor shall include sequence of operation by controls manufacturer.
- I. Contractor shall provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Contractor shall provide control diagrams by controls manufacturer as installed.
- K. Contractor shall provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- L. Contractor shall provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Contractor shall provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Additional Requirements: Contractor shall include all additional requirements as specified in Specification(s).
- O. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

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1.07 SUBMITTAL:

- A. Contractor shall submit to the District for review two (2) copies of preliminary draft or proposed formats and outlines of the contents of the Manual within thirty (30) days of Contractor's start of Work.
- B. For equipment, or component parts of equipment put into service during construction and to be operated by District, Contractor shall submit draft content for that portion of the Manual within ten (10) days after acceptance of that equipment or component.
- C. Contractor shall submit two (2) copies of a complete Manual in final form prior to final Application for Payment. Copy will be returned with Architect/Engineer comments. Contractor must revise the content of the Manual as required by District prior to District's approval of Contractor's final Application for Payment.
- D. Contractor must submit two (2) copies of revised Manual in final form within ten (10) days after final inspection.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Warranty/Guarantee Information;
- B. Special Conditions.

1.02 FORMAT

- A. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size.
- B. Cover: Contractor shall identify each binder with typed or printed title "WARRANTIES" and shall list title of Project.
- C. Table of Contents: Contractor shall provide title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible principal. Contractor shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the product or work item is specified.
- D. Contractor shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information and using separate typed sheets as necessary. Contractor shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

1.03 PREPARATION:

- A. Contractor shall obtain warranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s), within ten (10) days after completion of the applicable item or work. Except for items put into use with District's permission, Contractor shall leave date of beginning of time of warranty blank until the date of completion is determined.
- B. Contractor shall verify that documents are in proper form, contain full information, and are notarized, when required.
- C. Contractor shall co-execute submittals when required.

D. Contractor shall retain warranties until time specified for submittal.

1.04 TIME OF SUBMITTALS:

- A. For equipment or component parts of equipment put into service during construction with District's permission, Contractor shall submit a draft warranty for that equipment or component within ten (10) days after acceptance of that equipment or component.
- B. Contractor shall submit for District approval all warranties and related documents within ten (10) days after date of completion. Contractor must revise the warranties as required by the District prior to District's approval of Contractor's final Application for Payment.
- C. For items of work delayed beyond date of completion, Contractor shall provide an updated submittal within ten (10) days after acceptance, listing the date of acceptance as start of warranty period.

PART 2 - PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Documents on Work;
- B. Special Conditions.

PART 2 - RECORD DRAWINGS

2.01 GENERAL:

- A. As indicated in the Contract Documents, the District will provide Contractor with one set of reproducible, full size original Contract Drawings (mylars).
- B. Contractor shall maintain at each Project Site one set of marked-up plans and shall transfer all changes and information to those marked-up plans, as often as required in the Contract Documents, but in no case less than once each month. Contractor shall submit to the Project Inspector one set of reproducible vellums of the Project Record Drawings ("As-Builts") showing all changes incorporated into the Work since the preceding monthly submittal. The As-Builts shall be available at the Project Site. The Contractor shall submit reproducible vellums at the conclusion of the Project following review of the blueline prints.
- C. Label and date each Record Drawing "RECORD DOCUMENT" in legibly printed letters.
- D. All deviations in construction, including but not limited to pipe and conduit locations and deviations caused by without limitation Change Orders, Construction Claim Directives, RFI's, and Addenda, shall be accurately and legibly recorded by Contractor.
- E. Locations and changes shall be done by Contractor in a neat and legible manner and, where applicable, indicated by drawing a "cloud" around the changed or additional information.

2.02 RECORD DRAWING INFORMATION:

- A. Contractor shall record the following information:

- (1) Locations of Work buried under or outside each building, including, without limitation, all utilities, plumbing and electrical lines, and conduits.
- (2) Actual numbering of each electrical circuit to match panel schedule.
- (3) Locations of significant Work concealed inside each building whose general locations are changed from those shown on the Contract Drawings.
- (4) Locations of all items, not necessarily concealed, which vary from the Contract Documents.
- (5) Installed location of all cathodic protection anodes.
- (6) Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.
- (7) Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.
- (8) Sufficient information to locate Work concealed in each building with reasonable ease and accuracy.

In some instances, this information may be recorded by dimension. In other instances, it may be recorded in relation to the spaces in the building near which it was installed.

- B. Contractor shall provide additional drawings as necessary for clarification.
- C. Contractor shall provide reproducible record drawings, made from final Shop Drawings marked "No Exceptions Taken" or "Approved as Noted."
- D. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide electronic copies of the drawings (in PDF format) with one file with all of the sheets and one set of individual sheet files at the conclusion of the Project.

PART 3 - RECORD SPECIFICATIONS

3.01 GENERAL:

- A. Contractor shall mark each section legibly to record manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.
- B. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide one electronic copy of the specifications (in PDF format) at the conclusion of the Project.

PART 4 - MAINTENANCE OF RECORD DOCUMENTS

4.01 GENERAL

- A. Contractor shall store Record Documents apart from documents used for construction as follows:
 - (1) Provide files and racks for storage of Record Documents.
 - (2) Maintain Record Documents in a clean, dry, legible condition and in good order.
- B. Contractor shall not use Record Documents for construction purposes.

PART 5 – PRODUCTS Not Used.

END OF DOCUMENT

SECTION 02 31 05 TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide labor, material, equipment, and services necessary to complete the on-site trench backfilling and compacting as necessary for this project. Section includes, but is not limited to:
 - 1. Initial Backfill Material.
 - 2. Subsequent Backfill.
 - 3. Detectable Tape.
 - 4. Trench Excavation.
 - 5. Pipe Bedding.
 - 6. Trench Backfill.
 - 7. Trench Surfacing.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Work specified in Related Sections include:
 - 1. Section 31 20 00 – EARTHWORK MOVING.
 - 2. Section 33 10 00 – WATER SYSTEMS.
 - 3. Section 33 31 00 – SANITARY UTILITY SEWERAGE PIPING.
 - 4. Section 33 41 00 – STORM UTILITY DRAINAGE PIPING.

1.03 DEFINITIONS

- A. Engineered Fill:
 - 1. Soil or soil-rock material transported to the site by the Contractor in order to raise grades or to backfill excavations.
 - 2. Contractor shall provide sufficient tests, and a written statement that all materials brought onto the project site comply with specification requirements.
- A. Excavation: Consists of the removal of material encountered to subgrade elevations.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below base.
- C. Base: The layer placed between the subgrade and surface pavement in a paving system.
- D. Relative Compaction: In-place dry density of soil expressed as percentage of maximum dry density of same materials, as determined by laboratory test procedure American Society for Testing and Materials (ASTM) D1557.

E. System Description Requirements:

1. Comply with the recommendations of the Geotechnical Engineer.
2. Protect existing trees to remain. No grading is permitted under the drip line of protected trees.
3. Excavations for appurtenant structures, such as, but not limited to, manholes, transition structures, junction structure, vaults, valve boxes, catch basins, thrust blocks, and boring pits, shall be deemed to be in the category of trench excavation.
4. Unless otherwise indicated in the Drawings, all excavation for pipelines shall be open cut.

1.04 SUBMITTALS

- A. Comply with provisions of the Standard General Conditions and Agreement for Construction Services.
- B. Test Reports: Submit the following report for import material directly to the District's Representative from the Contractor's testing services:
 1. Compaction test reports for aggregate base.
- C. Submit description of compactors proposed for use when requesting placement of base material.

1.05 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 1. Comply with State of California Business and Transportation Agency, Department of Transportation (Caltrans) latest edition of "Standard Specifications." (Caltrans Standard Specifications).
 2. Comply with State of California Code of Regulations (CCR).
 3. Comply with State of California Construction Safety Orders, Latest Edition (CAL/OSHA).
- B. Soil Testing:
 1. Contractor shall engage a geotechnical testing agency, to include compaction testing and for quality control testing during fill operations.
 2. Test results will be submitted to the District's Representative.
- C. Codes and Standards:
 1. Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.
 2. California Department of Transportation Standard Specifications (Caltrans Standard Specification):
 - a. Section 19: Earthwork.
 - b. Standard Test Methods: No. 202.
 3. American Society for Testing and Materials (ASTM):
 - a. D1556: Density of Soil by the Sand Cone Method.

- b. D1557: Moisture Density Relations of Soils and Soil-Aggregate Mixtures.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect materials before, during and after installation.
- B. Comply with provisions of the Standard General Conditions and Agreement for Construction Services where necessary to control dust and noise on and near the work caused by operations during construction activities.

1.07 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the District.
 - 2. Protect existing streams, ditches and storm drain inlets during work on this project.
- B. Barricade open excavations and post with warning lights.
 - 1. Comply with requirements of the Standard General Conditions and Agreement for Construction Services.
 - 2. Operate warning lights and barricades as required.
 - 3. Protect structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement, undermining, washout, and other hazards.
- C. Protection of Subgrade: Do not allow equipment to pump or rut subgrade, stripped areas, footing excavations, or other areas prepared for project.
- D. Transport all excess soils materials by legally approved methods to disposal areas.
 - 1. Coordinate with the District's Representative.
 - 2. Any additional fill requirements shall be the responsibility of the Contractor.

1.08 EXISTING UTILITIES

- A. Locate existing underground utilities in the areas of work. For utilities that are to remain in place, provide adequate means of protection during excavation operations.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility agency immediately for directions.
 - 1. Cooperate with the District's Representative and public and private utility companies in keeping their respective services and facilities in operation.
 - 2. Repair damaged utilities to the satisfaction of the utility owner.
- C. Do not interrupt existing utilities serving facilities occupied and used by the District or others, except when permitted in writing by the District's Representative and then only after acceptable temporary utility services have been provided.

1.09 SEQUENCING AND SCHEDULING

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- A. The sequence of operations shall be reviewed by the District's Representative prior to commencement of any work.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Backfill materials will be subject to approval of the Engineer.
 - 2. For approval of backfill fill material, notify the District's Representative at least 7 days in advance of intention to import material.
 - 3. Consideration shall also be given to the environmental characteristics as well as the corrosion potential of backfill materials. Laboratory testing, including pH, soluble sulfates, chlorides, and resistivity shall be reviewed. Backfill materials shall not be more corrosive than the native materials.
- B. Trench Bedding/Sand:
 - 1. Material free from clay, organic materials, and other deleterious substances and conforming to Caltrans Standard Specification Section 19-3.025 B.
- C. Underdrain Trench Backfill:
 - 1. Granular material free from clay, organic materials, and other deleterious substances and conforming to Class 1 Type A Permeable Material, per Caltrans Standard Specification Section 68-1.025.
- D. Approved General Fill:
 - 1. Section 31 20 00 – EARTHWORK MOVING.
- E. Imported Fill:
 - 1. Section 31 20 00 – EARTHWORK MOVING.
- F. Class II Aggregate Base: $\frac{3}{4}$ " maximum, Class II AB, free from organic matter and other deleterious substances and conforming to Caltrans Standard Specification Section 26-1.02.
- G. Water: Clean and free from deleterious amounts of acids, alkalis, salts and organic matter.

2.02 BURIED WARNING AND IDENTIFICATION TAPE

- A. Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 75 mm 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.
 - 1. Warning Tape Color Codes.
 - Red: Electric.
 - Yellow: Gas, Oil; Dangerous Materials.
 - Orange: Telephone and Other Communications.

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Blue: Water Systems.

Green: Sewer Systems.

White: Steam Systems.

Gray: Compressed Air.

2. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.
3. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 920 mm 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.03 DETECTION WIRE FOR NON-METALLIC PIPING

- A. Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 – EXECUTION

3.01 GENERAL:

- A. Prior to commencement of work, become thoroughly familiar with site conditions.
- B. In the event discrepancies are found, immediately notify the District's Representative in writing, indicating the nature and extent of differing conditions.
- C. Backfill excavations as promptly as work permits.
- D. Do not place engineered fill or backfill until rubbish and deleterious materials have been removed and areas have been approved by the District's Representative.
- E. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
- F. In excavations, use satisfactory excavated or borrow material.
- G. Under grassed areas, use satisfactory excavated or borrow material.

3.02 COMPACTING

- A. Compact by power tamping, rolling or combinations thereof.
 1. Where impractical to use rollers in close proximity to walls, stairs, etc., compact by mechanical tamping.
 2. Scarify and re-compact any layer not attaining compaction until required density is obtained.

3.03 SITE PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, which are to remain, from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the District.

3.04 EXISTING UTILITIES

- A. Identify the location of existing utilities.
 - 1. Prior to trenching, the Contractor shall excavate at locations specifically indicated on the Drawings, if any, and where new lines cross other utilities of uncertain depth and determine the elevation of the utility in question to ensure that the new line will clear the potential obstruction.
 - 2. The Contractor shall contact Underground Service Alert (USA) at 1-800-227-2600 for assistance in locating existing utilities.
 - 3. If, after the excavation, a crossing utility does present an obstruction, then the line and grade of the new line will be adjusted as directed by the District's Representative to clear the utility.
- B. Protect all existing utilities to remain in operation.
- C. Movement of construction machinery and equipment over existing pipes and utilities during construction shall be at Contractor's risk.
- D. Excavation made with power-driven equipment is not permitted within 2 feet of any known utility or subsurface structure.
 - 1. Use hand or light equipment for excavating immediately adjacent to known utilities or for excavations exposing a utility or buried structure.
 - 2. Start hand or light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured.
 - 3. Support uncovered lines or other existing work affected by excavation until approval for backfill is obtained.
 - 4. Report damage of utility line or subsurface structures immediately to the District's Representative.
- E. Backfill trenches resulting from utility removal in accordance with this section.

3.05 TRENCH EXCAVATION

- A. General:
 - 1. Excavation shall include removal of all water and materials that interfere with construction. The Contractor shall remove any water which may be encountered in the trench by pumping or other methods during the pipe laying, bedding and backfill operations. Material shall be sufficiently dry to permit approved jointing.
 - 2. Excavation shall include the construction and maintenance of bridges required for vehicular and pedestrian traffic, support for adjoining utilities.

3. The Contractor shall be responsible to safely direct vehicular and pedestrian traffic through or around his/her work area at all times.
4. The Contractor shall relocate, reconstruct, replace or repair, at his/her own expense, all improvements which are in the line of construction or which may be damaged, removed, disrupted or otherwise disturbed by the Contractor.

B. Existing Paving and Concrete:

1. Existing pavement over trench shall be saw cut, removed, and hauled away from the job. Existing pavement shall be neatly sawcut a minimum of 6-inches beyond the limits of excavations.
2. Existing concrete over the trench shall be saw cut to a full depth in straight lines either parallel to the curb or right angles to the alignment of the sidewalk.
3. Boards or other suitable material shall be placed under equipment out rigging to prevent damage to paved surfaces.

C. Trench Width:

1. The maximum allowable trench widths at the top of the pipe shall be as follows:

<u>Pipe Type</u>	<u>Trench Width (Maximum)</u>
Copper	Outside diameter of barrel plus 18 inches
Plastic	"
Vitrified Clay	"
Cast-Iron	Outside diameter of barrel plus 24 inches
Concrete Cylinder	"
Ductile-Iron	"
Reinforced Concrete	"

- a. The maximum trench width shall be inclusive of all shoring.
- b. If the maximum trench width is exceeded, the District's Representative or Inspector of Record may direct the Contractor to encase or cradle the pipe in concrete at no additional charge.
2. For pipes 3 inch diameter and larger, the free working space on each side of the pipe barrel shall not be less than 6 inches.

D. Open Trench:

1. The maximum length of open trench shall be 300 feet or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is greater. No trench shall be left open at the end of the day.
2. Provisions for trench crossings and free access shall be made at all street crossings, driveways, water gate valves, and fire hydrants.

E. Excavation Bracing:

1. The excavation shall be supported and excavation operations shall be conducted in accordance with the California Industrial Accident Commission and CAL/OSHA.
2. The Contractor shall, at his/her own expense, furnish, put in place, and maintain such sheeting and bracing as may be required to support the sides of all excavations

(whether above or below the pipe grade), and to prevent any movement which could in any way diminish the required trench section or otherwise injure or delay the work. The sheeting and bracing shall be withdrawn in a manner such as to prevent any earth movement that might overload the pipe.

F. Excavated Material:

1. All excavated material not required for backfill shall be immediately removed and properly disposed of in a legal manner by the Contractor.
2. Material excavated in streets and roadways shall be laid alongside the trench no closer than 2 feet from the trench edge and kept trimmed to minimize inconvenience to public traffic.
3. Provisions shall be made whereby all storm and wastewater can flow uninterrupted in gutters or drainage channels.

3.06 PIPE BEDDING

A. Bedding Excavation: The trench shall be excavated below the grade of the pipe bottom to the following minimum depths:

<u>Pipe Type</u>	<u>Depth</u>
Copper	3 inch
Reinforced Concrete	3 inch
Plastic: 2 inch diameter and smaller	3 inch
Cast/Ductile Iron	6 inch
Plastic: over 2 inch diameter	6 inch

1. Stabilization of Trench Bottom: When the trench bottom is unstable due to wet or spongy foundation, trench bottom shall be stabilized with gravel or crushed rock. The Inspector of Record will determine the suitability of the trench bottom and the amount of gravel or crushed rock needed to stabilize a soft foundation. Soft material shall be removed and replaced with gravel or crushed rock as necessary.
2. Placement of Bedding Material: The trench bottom shall be cleaned to remove all loose native material prior to placing pipe bedding material. Pipe bedding shall be trench sand or trench gravel, as defined in these specifications. Sufficient pipe bedding material shall be placed in trench and tamped to bring trench bottom up to grade of the bottom of pipe, plus 1/8th of the pipe diameter. The relative compaction of tamped material shall be not less than 90 percent. It is the intention of these requirements to provide uniform bearing under the full length of pipe to a minimum width of 60 percent of the external diameter.

3.07 TRENCH BACKFILL

A. Initial Backfill:

1. Prior to trench backfill, the condition of the trench and lying of pipe must be inspected and approved by the Inspector of Record.
2. Trench Sand and Trench Gravel shall be used for initial backfill. After the pipe has been properly laid and inspected, initial backfill material shall be placed on both sides of the pipe and compacted to final depth as follows:

<u>Pipe Type</u>	<u>Depth</u>
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Copper	6 inches above top of pipe
Cast Iron	6 inches above top of pipe
Plastic: less than 3 inches diameter	6 inches above top of pipe
Plastic: 3 inches diameter and larger	12 inches above top of pipe
Ductile Iron	12 inches above top of pipe
Reinforced Concrete	½ outside diameter of pipe (pipe spring line)

3. **Compaction:** Initial backfill compaction shall be by mechanical means. The initial backfill material shall be hand tamped in layers not exceeding 4 inches in uncompacted depth and shall be brought up uniformly on both sides of the pipe to avoid bending or distortional stress. After hand tamping, the relative compaction of the initial backfill material shall be not less than 90 percent.
4. **Pipe Detection:** In trenches containing pressurized plastic pipes, tracer wire shall be placed directly above the pipe and shall be connected to all valves, existing exposed tracer wires, and other appurtenances as appropriate.

B. Subsequent Backfill:

1. Subsequent backfill material shall consist of approved native material, imported fill, or Class II AB conforming to these specifications.
2. Structure and utility trench backfill should be moisture conditioned, placed in lifts eight inches or less in loose thickness, and mechanically compacted to at least 90 percent relative compaction except the relative compaction shall not be less than 95 percent within 2-1/2 feet of finished permanent surface grade or 1-1/2 feet below the finished subgrade, whichever is greater; jetting will not be permitted. The moderately expansive clay soils exposed in trenches should not be allowed to dry out prior to placement of trench backfill materials.
3. It must be the contractor's responsibility to select equipment and procedures that will accomplish the grading as described above. He/she must organize his/her work in such a manner that the Soil Engineer can test and/or observe each element of grading.

C. Jetting and Ponding:

1. Jetting of trench backfill is not permitted.

D. Compaction Testing:

1. Compaction testing shall be in accordance with California Test Method ASTM D1556 or D1557.

3.08 TRENCH SURFACING

A. Unpaved Areas:

1. In unimproved areas, the trench surface shall be restored to its original condition. No mounds of earth shall be left along the trench. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
2. Where completed compacted areas are disturbed by subsequent construction operation or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work, including retesting, prior to further construction.

B. Temporary Surfacing:

1. Temporary surfacing shall be a minimum of 2 inches of cutback asphalt on 10 inches of Class 2 aggregate base and shall be placed at all trench locations subject to vehicular or pedestrian traffic.
2. Temporary surfacing shall be laid within one day after backfilling (except where the Contractor elects to place permanent surfacing within this time period).
3. Before the trenching area is opened for traffic, all excess dirt, rock, and debris shall be removed, the street surface shall be swept clean and the pavement shall be washed down with a water truck and pressure nozzle.
4. Temporary surfacing shall be maintained to prevent the occurrence of mud holes and prevent the surface from settling below 1 inch or rising more than 1 inch from the existing pavement grade.

3.09 MOISTURE CONTROL

- A. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

3.10 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Testing Services: Allow testing agency to test each backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
- B. When testing agency reports that backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, re-compact and retest until required density is obtained.

3.11 PROTECTION

- A. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operation or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work, including retesting, prior to further construction.

3.12 CLEAN-UP

- A. Remove all debris, equipment, tools and materials upon completion prior to final inspections to the satisfactions of the engineer.
- B. In unpaved areas without landscaping, cover with straw erosion control blanket. Follow manufacturer's recommendations for installation. Provide and place straw wattles or biodegradable fiber logs across the slope at the midpoint and along the downhill edge of site. No soil is to be left uncovered at the completions of construction.

Attachments

- None

END OF SECTION

SECTION 02 41 19 SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Comply with rules and regulations of State of California, California Code of Regulations, Title 8, Industrial Relations, Chapter 4, Subchapter 4, "Construction Safety Order."
- C. Comply with applicable local and state agencies having jurisdiction.
- D. Comply with governing EPA notification regulations.

1.02 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected site elements.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
 - 1. Section 01 11 00 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 01 73 29 "Execution" for cutting and patching procedures.
 - 3. Section 01 76 00 "Alteration Project Procedures" for general protection and work procedures for alteration projects.
 - 4. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.03 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, and deliver to Owner ready for reuse.
- 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.

- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.04 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to District Representative.

1.05 PREINSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site if demolition of site is complicated or selective demolition of structures.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- C. 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.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. 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 01 32 33 "Photographic Documentation." Submit before Work begins.
- E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

- F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.07 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.08 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.09 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Coordinate with District environmental consultant for abatement of hazardous material. District preference is for abatement of asbestos versus encapsulating.
 - 3. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 4. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- D. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. 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.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.

- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.11 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing 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

3.01 EXAMINATION

- A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- B. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- C. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, or preconstruction photographs or video.
 - 1. Comply with requirements specified in Section 01 32 33 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.02 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 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 and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.04 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 demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.05 **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. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least four hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 50 13 "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, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area on-site as designated by Owner.
 - 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.06 **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.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.07 **DISPOSAL OF DEMOLISHED MATERIALS**

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 01 50 13 "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.

3. Comply with requirements specified in Section 01 50 13 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

3.08 **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.

B. Finish of repaired surfaces shall be uniform and free from blemishes and variations in color and surface texture.

Attachments

- None

END OF SECTION

SECTION 02080 – ASBESTOS ABATEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Examine all other Sections of the Specifications for requirements therein affecting the work of this Section of the Specifications.

1.02 COMPLIANCE AND INTENT

- A. The Contractor is responsible for repair, to the satisfaction of the Owner, of surfaces not scheduled for demolition that become damaged as a result of the work. All unscheduled repair work shall be at no increase to contract price.
- B. This project deals with construction activities that will impact asbestos-containing window glazing compound and sealants and interior basecoat mastic. It is necessary for the Contractor to coordinate all asbestos-related construction work with the specifications. During all work, provide monitoring and worker protective equipment in accord with the California Occupational Safety and Health Administration (Cal-OSHA) and as required by this specification. Where there is conflict, the most stringent requirement shall apply.
- C. The work covered by this specification includes the handling, removal, preparation, encapsulation and proper disposal of asbestos-containing materials. All asbestos-containing materials to be removed shall be removed and disposed of according to all federal, state and local regulations. The cleanup of any incidental asbestos found in areas undergoing asbestos-related construction work that become separated from the buildings during the dismantling process are part of the work.
- D. The workers completing asbestos-related construction shall have received asbestos training in accordance with Cal-OSHA.
- E. Furnish all labor, materials, facilities, equipment, services, employee training, medical monitoring, permits and agreements necessary to perform the work required for asbestos-related construction in accordance with this specification.
- F. Comply with all federal, state, and local regulations pertaining to asbestos-related construction, storage, transportation and disposal; employee health and safety; Contractor certifications; and all licenses, permits, and training.
- G. Work on the premises shall be confined to areas designated in the Contract Documents. Materials and equipment shall be stored within areas designated by the Owner. Should additional space be required, the Contractor shall request permission for additional space and shall adequately safeguard occupants from associated health and safety hazards.

- H. Perform all work specified herein with competent persons trained, knowledgeable and qualified in state-of-the-art techniques relating to asbestos-related construction, handling, and the subsequent cleaning of contaminated areas.
- I. During asbestos-related construction activities, the Contractor shall protect against contamination of soil, water, plant life, and adjacent building areas, and shall ensure that there is no airborne release of dusts. The Owner may collect air in the building and in adjacent areas to evaluate the Contractor's performance. Evidence of settled dust or airborne levels of contaminants above background will require the implementation of additional controls at no increase to contract price.
- J. It is the Contractor's responsibility to determine the quantities of asbestos-related construction prior to commencement of the project. The Contractor shall conduct a site visit to determine exact locations of materials that will be impacted. This section provides appropriate protocols for handling and disposal of asbestos-containing materials. All asbestos-containing materials shall be handled according to the procedures outlined in this specification. If additional suspect asbestos-containing materials are discovered during the course of the work, immediately notify the Owner and/or the Owner's Designated Representative.
- K. The work of this section shall be performed by an entity that holds a current, valid contractors license issued by the California State Contractor's Licensing Board (SCLB). Display a copy of CSLB license in a visible place at the job-site.
- L. Asbestos-containing materials removed during the work shall be disposed of in an approved manner complying with all applicable federal, state, and local regulations. Appropriate waste manifests or letters of salvage shall be furnished to the Owner thereby limiting the Owner's liability for improperly salvaged items. Materials are conveyed to the Contractor "as is," without any warranty, expressed or implied, including but not limited to, any warranty to marketability or fitness for a particular purpose, or any purpose. The Owner or the Owner's Designated Representative shall approve the waste disposal site(s) prior to disposal.

1.03 DEFINITIONS

- A. The following definitions pertain to work of this section.
 - 1. Abrasive Removal: Any form of sanding, grinding or high pressure media blasting utilized to remove coatings or prepare a surface for encapsulation.
 - 2. Airlock: A system for permitting ingress and egress with minimum air movement between a contaminated area and uncontaminated areas. Typically consists of two curtained or gasketed doorways separated by a distance of at least six feet such that one passes through one doorway into the airlock, allowing the doorway to close off the opening. This airlock must be maintained in uncontaminated condition at all times.
 - 3. Area Monitoring: Sampling of airborne asbestos concentrations within the work area and outside the work area. Sampling shall represent airborne concentrations that may reach the breathing zone.

4. Asbestos: A generic name given to a number of naturally occurring hydrated mineral silicates that possess a unique crystalline structure, are incombustible in air, and are separable into fibers. Asbestos includes the asbestiform varieties of Chrysotile (serpentine), Crocidolite (Riebeckite), Amosite (Cummingtonite-Grunerite), Anthophyllite, Actinolite, and Tremolite.
5. Authorized Visitor: Designated employees or consultants for the Owner and representatives of any federal, state or local regulatory or other agency having jurisdiction over the project.
6. Breathing Zone: A hemisphere forward of the shoulders and head with a radius of approximately six to nine inches.
7. Breach: A rift or gap in the critical or secondary barriers that allow egress of air from the containment to outside, or vice versa.
8. Cal-OSHA: State of California, Occupational Safety & Health Administration.
9. Chain-of-Custody: A legal concept involving documentation of the physical possession of a sample(s) from the moment it is collected, transported, analyzed, and ultimately stored in an archive.
10. Change Rooms: Refers to the two chambers in the decontamination area used to change into and out of protective clothing.
11. Certified Industrial Hygienist (CIH): A person certified by the American Board of Industrial Hygiene.
12. Clean Room: An uncontaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of workers' street clothes and protective equipment.
13. Competent Person: One who is capable of identifying existing and predictable hazards and who has the authority to take prompt corrective measures to eliminate them.
14. Critical Barrier: A unit of temporary construction that provides the only separation between the work area and an adjacent potential occupied space. This includes the decontamination unit, perimeter walls, ceilings, penetrations and any temporary critical barriers between the work area and the uncontaminated environment.
15. CSLB: Contractors State Licensing Board
16. Decontamination Area: Area which is constructed to provide the means for workers to store clothing, equipment and other articles, and to properly remove contamination upon concluding work activities that result in exposure to these hazardous materials.
17. DOP: Dioctylphthalate, the challenge aerosol used to perform on-site leak testing of HEPA filtration equipment.
18. DOT: Federal Department of Transportation.
19. DOSH: Division of Occupational Safety & Health (see also Cal-OSHA)

20. Decontamination Unit: Refers to system of airlocks used to decontaminate personnel, waste bags, equipment, etc. when exiting the work area. A decontamination unit shall be set up for each containment area.
21. Demolition: The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.
22. Equipment Decontamination Enclosure System: A decontamination enclosure system for materials and equipment, typically in a designated area of the work area, and including a washroom, a holding area, and an uncontaminated area.
23. Equipment Room: A contaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment. The equipment room shall be kept clean from asbestos-containing debris at all times.
24. Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.
25. Fixed Object: A unit of equipment or furniture in the work area that cannot be removed from the work area.
26. HEPA: High Efficiency Particulate Air filter capable of filtering out airborne particulate 0.3 microns or greater in diameter at 99.97 percent efficiency.
27. Movable Object: A unit of equipment or furniture in the work area that can be removed from the work area (e.g., smoke detectors, lights, etc.)
28. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere, and negative during inhalation in relation to the air pressure of the outside atmosphere.
29. Negative Pressure: Air pressure lower than surrounding areas, generally caused by exhausting air from a sealed space (work area).
30. NIOSH: National Institute for Occupational Safety and Health: Sets test standards, analytical methods, and certifies performance of various respirator designs (research institute within Federal OSHA).
31. NIST: National Institute of Standards and Technology: Administers the NVLAP Program.
32. Permissible Exposure Limits (PEL): An eight-hour time weighted average concentration of 0.1 fibers per cubic centimeter.
33. Personal Monitoring: Sampling for asbestos concentrations within the breathing zone of an employee.

34. Powered Air Purifying Respirator (PAPR): A full-face piece respirator that has the breathing air powered to the wearer after it has been purified through a filter.
35. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
36. Remodel: Replacement or improvement of an existing building or portion thereof where exposure to asbestos may result. Remodel includes, but is not limited to, installation of materials, demolition, cutting, patching, and removal of building materials.
37. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.
38. Shower Room: A room between the clean room and the equipment room in the work decontamination enclosure system. This room contains hot and cold or warm running water and soap suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.
39. Supervisor: An individual who typically fulfills the duties of “supervisor” as defined by Title 8 CCR 1529. This individual must supply documentation asbestos training in accordance with Cal-OSHA requirements, as applicable. The supervisor must be on-site during all asbestos-related construction work.
40. Visible Emissions: Any emission containing particulate material that is visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
41. Visual Inspection: A visual inspection by Environmental Consultant, of the work area under adequate lighting to ensure that the work area is free of visible debris and dust.
42. Washroom: A room between the work area and the holding area in the equipment decontamination enclosure system equipped with water for decontamination of equipment and sealed waste containers. The washroom or shower room comprises one airlock.
43. Water Filtration: Refers to water filtration to as small a particulate size as technically feasible, but not more than 5 microns.
44. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, HEPA vacuuming, or other cleaning utensils dampened with amended water and afterward thoroughly decontaminated or disposed of as contaminated waste.
45. Work Area: The area where asbestos-related construction work is performed and that is defined or isolated to prevent the spread of asbestos dust or debris, and entry by unauthorized personnel. Work area is a regulated area as defined by Title 8 CCR 1529.

1.04 SCOPE OF WORK

- A. Window glazing compound and window sealants contain >1% asbestos. Removal of the window systems is considered Class II asbestos abatement work. (See laboratory results attached)
- B. Interior base cove mastics are asbestos-containing. Any removal of this material is considered Class II asbestos abatement work. (See laboratory results attached)
- C. The Contractor is responsible for preparing the asbestos abatement work plan in accordance with Section 1.06, B, 1 of this Specification.
- D. The Contractor is responsible for proper handling, personnel monitoring, personnel protection, and disposal of asbestos-containing debris.
- E. Contractor shall conduct personal monitoring and provide workers with appropriate personal protective equipment if necessary. All work shall be conducted in a manner that does not release asbestos dust to the surrounding areas.
- F. The Contractor is responsible for conformance with all applicable regulations, including, but not limited to CAL/OSHA Worker Protection.

1.05 REFERENCES

- A. The publications listed below form a part of this specification by reference. The publications are referred to in the text by basic designation only. If there is a conflict between any of the listed regulations or standards, then the most stringent or restrictive shall apply.
- B. American National Standards Institute (ANSI) and American Society for Testing and Materials (ASTM)
 - 1. ANSI Z9.2, 1979 (R 1991), Fundamentals Governing the Design and Operation of Local Exhaust Systems
 - 2. ANSI Z87.1, 2003, Occupational and Educational Eye and Face Protection
 - 3. ANSI Z88.2 1992, Respiratory Protection
 - 4. ANSI Z89.1, 1986, Requirements for Protective Headgear for Industrial Workers
 - 5. ANSI Z41, 1999, Personal Protection – Protective Footwear
 - 6. ANSI Z88.6, 1984, Respiratory Protection – Respiratory Use Physical Qualifications for Personnel
 - 7. ASTM C 732, 1982 (R 1987) Aging Effects of Artificial Weathering on Latex Sealants
 - 8. ASTM D 522, 1993 (Rev. A) Mandrel Bend Test of Attached Organic Coatings
 - 9. ASTM D 1331, Solutions of Surface-Active Agents

10. ASTM D 2794, 1993 Resistance of Coatings to the Effects of Rapid Deformation (Impact)
 11. ASTM E 84, 1991 (Rev. A) Surface Burning Characteristics of Building Materials
 12. ASTM E 96, 1994 Water Vapor Transmission of Materials
 13. ASTM E 119, 1988 Fire Tests of Building Construction and Materials
 14. ASTM E 736, 1992 Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- C. California Assembly Bills (CAB)
1. CAB 040, Yearly Registration of Contractors
- D. California Code of Regulations (CCR)
1. CCR ESO, Electrical Safety Orders, Chapter 4, Subchapter 5
 2. CCR 1523, Illumination
 3. CCR 1529, Asbestos in the Construction Industry
 4. CCR 3203, Injury and Illness Prevention Program
 5. CCR 3204, Access to Employee Exposure and Medical Records
 6. CCR 3220, Emergency Action Plan
 7. CCR 3221, Fire Prevention Plan
 8. CCR 5144, Respiratory Protection Equipment Standard
 9. CCR 5194, Hazard Communication Standard
 10. CCR 6003, Accident Prevention Signs
 11. Title 22, Division 4, Minimum Standards for Management of Hazardous and Extremely Hazardous Waste
- E. California Health and Safety Code (CHSC)
1. CHSC 20
Division 20,
- F. California Labor Code (CLC)
1. CLC DIVISION 5, Part 1, commencing with 6300
- G. California Propositions (CP)
1. CP 65, Proposition 65
- H. California State Board of Equalization (CSBE)
1. CSBE ETU, Excise Tax Unit
- I. California State License Board (CSLB)

1. CSLB CBPC, California Business and Professional Code Sections 7058.5 and 7058.7, "Certification"
- J. Code of Federal Regulations (CFR)
1. 29 CFR 1910.134, Respiratory Protection
 2. 29 CFR 1910.141, Sanitation
 3. 29 CFR 1910.145, Accident Prevention Signs and Tags
 4. 29 CFR 1926.21, Safety Training and Education
 5. 29 CFR 1926.55, Gases, Vapors, Fumes, Dusts, and Mists
 6. 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response
 7. 29 CFR 1926.59, Hazard Communication
 8. 29CFR 1910.1000, Air Contaminants
 9. 29 CFR 1926.1101, Asbestos
 10. 40 CFR 260, Hazardous Waste Management Systems: General
- K. Underwriters Laboratories, Inc. (UL)
1. UL 586-96, 1996 Test Performance of High-Efficiency Particulate Air Filter Units

1.06 SUBMITTALS PRIOR TO START OF WORK

- A. The reviews by the Owner or Owner's designated representative are intended to be only for general conformance with the requirements. The Owner or the Owner's designated representative assumes no responsibility for permits, licenses, notices, materials and methods, equipment or temporary construction required to execute the work described in this Section of the Specification or in other Sections of the Specification or in other documents included in the contract documents.
- B. Before commencing asbestos-related construction work, submit the following for review by the Owner or Owner's designated representative:
1. Provide a detailed asbestos-related construction work plan that follows Attachment A – Asbestos Work Plan Outline.
 2. Provide a asbestos site safety plan prior to project initiation. The site safety plan shall deal with, at a minimum: site safety and health hazards; contaminant release incidents; control of water leakage or discharge within and/or from the work area; medical emergency; Contractor's internal administrative and inspection procedures; earthquakes and/or fire emergency procedures; protocol for responding to complaints or questions from interested parties; 24-hour emergency telephone numbers for company officers with authority to respond to emergencies.

3. Supervisor (as defined by Title 8 CCR 1529): Demonstrate education and specialized training with successful completion of Cal-OSHA
4. Workers: Demonstrate education and specialized asbestos training in accordance with Cal-OSHA.
5. Proof of Respirator Fit Testing: Provide proof of respirator fit testing. Fit testing records must be less than eleven (11) months old and document testing on the type of respiratory protective equipment used for this project. Fit testing records must be signed by the Competent Person.
6. Foreman Training: Submit evidence that the foreman to be used on the job fulfills the qualifications detailed in this specification and has experience in similar jobs.
7. Medical Examinations: Submit evidence signed by a physician that each employee used on the job has received an appropriate medical examination as detailed in Title 8 CCR 1529. The submitted document must be less than eleven (11) months old.
8. Written Notification to Fire and Police Departments: Provide documentation showing notification to local fire and police departments of the asbestos-related construction work three (3) days before commencement.
9. Rental Equipment: When rental equipment is to be used in the work areas or to transport asbestos waste, the Contractor shall provide written notification regarding intended use of the rental equipment to the rental agency before use, with copies to the Owner or Owner's designated representative.
10. Certificates of Compliance: Submit manufacturer's certification that vacuums, ventilation equipment, and other equipment required to contain asbestos dust conform to ANSI Z9.2. Submit results of onsite DOP testing of all HEPA-filtered ventilation equipment.
11. Submit a statement of intent to dispose of all waste at a Landfill from the Owner's Pre-Approved list. Submit uniform hazardous waste manifests prepared, signed and dated by an agent of the landfill. The manifest must certify the amount of hazardous materials delivered to the landfill. The manifest must be provided to the Owner or Owner's designated representative within ten working days after delivery.
12. Satisfactory proof that written notification has been provided to Cal-OSHA and BAAQMD, as appropriate.
13. Licenses: Submit copies of state and local licenses and permits necessary to carry out the work of this contract.
14. Notification of Other Contractors: If other contractors are working at the job site, before beginning any work the Contractor must inform all other contractors in writing regarding the location, nature, and requirements of the work areas.

15. Safety Data Sheets/Specification Sheets: The Contractor shall submit Safety Data and Specification Sheets for all chemicals, encapsulants, etc. to be used for this project.

1.07 SUBMITTALS AT THE COMPLETION OF THE PROJECT

- A. Upon completion of on-site work, Contractor shall provide a detailed project summary that will include each of the items listed below. The project Summary shall be submitted and approved by the Owner's representative prior to acceptance of final pay request and shall include the following:
 1. Copies of the Security and Safety Logs showing names of persons entering the workspace. The logs shall include date and time of entry and exit, supervisor's record of any accident (detailed description of accident).
 2. Emergency evacuations and any other safety or health incident.
 3. Copies of all Waste Manifests.
 4. Chain of Custody documentation and laboratory reports for all analysis performed.
 5. Personal air sample results.
 6. Pressure differential strip chart readings for each differential recording device on the site.
 7. Project Summary:
 - a. Contractor's name and address, certification number (CSLB) and Tax ID number.
 - b. Hazardous waste hauler certifications.
 - c. Name, address and registration number of hazardous waste hauler.
 - d. Laboratory performing analyses and results of waste characterization testing.
 - e. Contract number and name of project.
 - f. Specific inventory (including locations and approximate quantities) of the asbestos-containing materials removed or handled.
 - g. Number of employees working on the project.
 - h. Dates of commencement and completion of on-site work.
 - i. Work method employed (i.e., poly drop sheets and barrier tape, mini-containment, full containment with negative air and decontamination enclosure system, etc.)
 - j. Name, location, telephone number and EPA registration of waste disposal site(s) used.
 - k. DOP testing results.

1.08 CONTRACTOR MONITORING

- A. The Owner or Owner's designated representative reserves the right to perform air sampling and wipe sampling in selected areas during the course of the project. Owner or Owner's designated representative reserves the right to stop work within in an area if in the course of performing monitoring, the Owner or Owner's designated representative observes instances of substantial non-conformance with this Section or other Sections of the Specification presenting health hazards to workers, the general public or the surrounding areas. Work shall not resume until the corrective measures have been enforced. Instances of substantial non-conformance shall include, but not be limited to, the following:
 - 1. Activities or misconduct imperiling worker's safety and health.
 - 2. Airborne asbestos concentrations outside of the work area exceeding background or 0.01 f/cc, whichever is greater.
 - 3. Loss of negative pressurization.
 - 4. Breaches in containment resulting in potential release of asbestos to non-work areas.
- B. The Environmental Consultant may perform air and/or wipe sampling inside and outside the work area during all phases of the work. The Contractor shall cooperate fully with the Consultant and ensure the cooperation of his workers during collection of air/wipe samples and work area inspections.
- C. When visual inspections or air monitoring are specified, the Contractor shall notify the Owner or Owner's designated representative in writing 24 hours in advance of the day and time when the Contractor will be ready for such inspections or monitoring. Such requests shall be initiated by the Contractor's Supervisor or Foreman indicating that the work area has been previously inspected and is ready for inspection/testing.
- D. Air monitoring generated by the Owner or Owner's designated representative shall not be used by the Contractor to represent compliance with regulatory agency requirements for monitoring of workers exposure to airborne asbestos, nor shall any other activity on the part of the Owner or Owner's designated representative be construed to meet the Contractor's compliance with applicable health and safety regulations.

PART 2 - PRODUCTS

2.01 SIGNS AND LABELS:

- A. Provide labeling in accordance with State and Federal EPA requirements. Provide the required signs, labels, warnings, placards or posted instructions for containers used to transport hazardous material to the landfill.
- B. Location of Caution Signs and Labels: Provide bilingual caution signs at all approaches to work areas in languages used by the Contractor's employees. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area.
- C. Provide at all entrances to asbestos work areas signs as follows:

**DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY**

1. Postings shall be in English and Spanish, and in any language used by any of the Contractor's employees as the primary language of communication.

2.02 CHEMICAL STRIPPERS

- A. Unless approved in advance by the Owner or Owner's designated representative Dumond Chemical products are the products approved for chemical paint removal work.

2.03 ENCAPSULANTS

- A. NOT USED

2.04 PLASTIC SHEETING:

- A. Use fire-retardant (FR) polyethylene (poly) film.
 1. Thickness - 6-mil, minimum, NO EXCEPTIONS.
 2. Flame Resistance/Flame Spread Rate <25.
 3. Conforms to NFPA #701 and Tested in accordance with ASTM E-84.

2.05 TAPE, ADHESIVE, SEALANTS:

- A. Tape, 2" or wider, shall be capable of sealing joints of adjacent sheet of polyethylene and shall attach polyethylene sheet to finished or unfinished surfaces or similar materials. Tape shall be capable of adhering under dry and wet conditions, including use of amended water. Taping to critical or sensitive surfaces shall be completed using preservation sealing tape.
- B. Spray adhesive for sealing polyethylene to polyethylene shall contain no methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.
- C. Fire resistant sealants shall be compatible with concrete, metals, wood, etc. Sealant shall prevent fire, smoke, water and toxic fumes from penetrating. Sealant shall have a flame spread, smoke and fuel contribution of zero, and shall be ASTM and UL rated for 3 hours for standard method of fire test for fire stop systems.

2.06 STRIP CHART RECORDER(S):

- A. Where interior negative pressure work areas are required, each shall have a minimum differential pressure of 0.025 inches water gage at all times.

Fluctuations below .025 inches of water column are unacceptable and may require temporary cessation of work until conditions are corrected.

- B. Multiple continuous circular chart recorder(s) shall be used to document the level of pressure difference between the containment space and all other spaces as deemed necessary by the Owner or Owner's designated representative. Defective or non-operating instrumentation may require temporary cessation of work until instrumentation is repaired or replaced.
- C. The strip chart recorder will be checked a minimum of four times per day by a person familiar with the operation. Each check shall be documented on the circular chart with a time and date notation and the initials of the person performing the check. A copy of the circular chart shall be submitted daily to the Owner or Owner's designated representative.
- D. Differential air pressure systems shall be in accordance with Appendix J of EPA's "Guidance for Controlling Asbestos-Containing Materials in Buildings, EPA 560/5-85-024. The Differential pressure system shall be continuously monitored by the Contractor using a recording instrument connected to an appropriate strip chart recorder. The recording instrument shall be connected to an audible alarm that will activate at a pressure differential of -0.025 inches water gauge air pressure.

2.07 VACUUM EQUIPMENT:

- A. All vacuum equipment used in the work area shall use HEPA filtration systems and be of the wet-dry type. The Contractor shall provide on-site independent DOP testing to document the effectiveness of the vacuum units. The test results shall be signed by the individual performing the testing.

2.08 LOCAL EXHAUST SYSTEM:

- A. Where containments are required, sufficient High Efficiency Particulate Absolute (HEPA) ventilation units shall be used to maintain the negative pressure in each interior work area at 0.025 inches of water column and a minimum of four (4) air changes per hour.
- B. The ventilation system shall remain in operation 24 hours a day until the work area has passed the specified clearance criteria. HEPA filtered air which is exhausted to maintain negative pressure shall be exhausted from the building at locations approved by the Owner or Owner's designated representative. Exhausted air shall not be near or adjacent to other building intake vents or louvers or at entrances to buildings. Other HEPA units shall operate within the enclosure to circulate air and control fiber counts.
- C. The Contractor shall provide on-site independent DOP testing to document the effectiveness of the air filtration units. The test results shall be signed by the individual performing the testing. Repeat testing if the unit or the air filtration units have been repaired or replaced. Repeat DOP testing after thirty days. Provide documentation to the Owner or Owner's designated representative with 24 hours of DOP testing.

2.09 RESERVE EQUIPMENT:

- A. Contractor shall have the following equipment on site: two reserve, functioning and DOP-tested HEPA Filter Vacuum Cleaning Units, two reserve and DOP-tested HEPA area filtration units for every four containments. Contractor shall also have sufficient polyethylene (poly), respirators, protective equipment, tape, tools, and decontamination enclosure systems for each work area.
- B. Provide authorized visitors, Owner, Consultants or other contractors requiring access to the work area with suitable protective clothing, headgear, eye protection, as described in this specification, whenever the visitor must enter the work area. The Contractor shall have available and maintain at all times a minimum of three (3) suits and other suitable protective equipment for this purpose. All protective equipment shall be new and for the exclusive use of visitors.
- C. The Contractor shall document that each visitor has been trained and fit-tested prior to entering a work area.

2.10 SCAFFOLDING:

- A. Scaffolding, as required to do the specified work, shall meet all applicable safety regulations and DOSH standards. A non-skid surface shall be furnished on all scaffold surfaces subject to foot traffic. Contractor must comply with Owner's and General Contractor's Fall Protection Requirements.

2.11 TRANSPORTATION EQUIPMENT:

- A. Transportation equipment, as required, shall be lockable and suitable for loading, temporary storage, transit and unloading of contaminated waste without exposure to persons or property. Any vehicle used to transport asbestos waste shall be properly registered with all applicable controlling agencies.

2.12 CONNECTIONS TO WATER SUPPLY:

- A. Contractor shall assure that all connections to the site's water system shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water shall not damage existing finishes or equipment.
- B. Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system in each work area. Provide fittings as required to allow for connection to existing wall hydrants or spouts.

2.13 OTHER TOOLS AND EQUIPMENT:

- A. The Contractor shall provide other suitable tools for the asbestos-related construction and disposal activities.

- B. Prohibited Equipment: The following equipment is prohibited from use on this project unless accepted in writing by the Owner or Owner's designated representative:
1. High or low pressure water-blasting equipment for hosing of work areas.
 2. Vacuum-powered removal or collection equipment located outside the work area, such as a "Vacu-Loader".
 3. Gasoline, propane, diesel or other fuel powered equipment inside the building, unless previously approved in writing by the Owner or Owner's designated representative.
 4. Equipment that creates excessive noise or vibration that would affect the safety of the building or generate complaints from neighboring building occupants. No equipment shall exceed an A-weighted sound level of 85 dB as measured at 3 ft. from the radiating source without written permission of the Owner or Owner's designated representative.
 5. Flammable solvents with a flash point below 140 degrees F or materials containing ethylene glycol ether, methylene chloride, ethyl chloroform (1,1,1-trichloroethane), or other hazardous substances.
 6. Non-fire retardant polyethylene sheeting.
 7. Polyurethane spray foam for application in fire-rated assemblies, including but not limited to penetrations into stairwells, mechanical rooms, electrical closets, rated floor-to-floor assemblies, etc.

PART 3 - EXECUTION

3.01 INITIAL AREA ISOLATION

- A. The Owner or the Owner's designated representative reserves the right to inspect and approve all work area setups before any asbestos-related construction work is undertaken.
- B. If a work area is breached (failure of polyethylene seals, visible dust emission, airborne asbestos level above background, etc.), the Contractor shall take immediate action to control the breach and clean the area to the satisfaction of the Owner or the Owner's designated representative.
- C. If sample results indicate that conditions have exceeded the baseline, as determined by the Owner or Owner's designated representative, all work shall cease. Work shall not recommence until the condition(s) causing the increase have been corrected.
- D. Shut down and disconnect all electrical power, gas, sewage, water, phone lines, fire life safety lines and sprinkler systems to the work area so that there is no possibility of reactivation and electrical shock.
- E. Provide all connections for temporary utilities in the work area needed throughout abatement. Temporary electrical power shall be according to OSHA and the National Electrical Code for Wet Environments.

- F. Contractor shall conform to the Owner's lockout requirements, and secure the work area at all times. Area entrances and exits shall be secured by the Contractor throughout the abatement phase. Unauthorized visitors are strictly prohibited. Only the Contractor, Owner or Owner's designative representatives are permitted at the job site. Contractor shall ensure that all doors, gates, windows, and potential entrances to the work areas and the designated waste location areas are secured and locked at the end of each workday.
- G. Contractor shall store all materials, equipment, and supplies for the project inside the building or in areas designated by the Owner. Materials shall be stored in accordance with Owner's requirements.
- H. As required, establish designated limits for the asbestos-related construction work area with continuous barriers. Use barrier tape (3-inch) with a pre-printed asbestos warning throughout exterior work areas. Provide signs around the perimeter of all the interior works areas according to Cal-OSHA.
- I. The Contractor shall be responsible for identifying all HVAC components (if applicable) that asbestos into or out of the work areas. All components shall be disconnected and sealed airtight for the duration of the work. All openings shall be sealed with two (2) layers of 6-mil polyethylene secured with duct tape, as applicable.
- J. Pre-clean the work area and fixed objects in the work area using HEPA filtered vacuums and/or wet cleaning methods. Protect fixed objects with protective barriers (as appropriate) and cover with 6-mil poly sealed with tape.

3.02 CONTAINMENT SET-UP PROCEDURES

- A. Containment is required for exterior asbestos disturbance work.
- B. Removal can be conducted in mini enclosure constructed in a lift or from scaffolding. Contractor shall seal operable windows and air intakes within 50 feet of the work area with two layers of 6-mil polyethylene sealed with tape. A 6-mil polyethylene drop sheet is required to extend 10 feet beyond the work area when debris, dust or waste is expected to be generated.
- C. Contractor shall construct a full containment negative pressure containment on the interior prior to any window removal work. Install critical barriers consisting of one layer of 6-mil poly on windows and doors. Cover floor and wall surfaces with 6-mil poly sealed with tape. Cover floors first so that plastic extends up the walls at least 12 inches, then cover walls with 6-mil poly to the floor level, thus overlapping the floor material by a minimum of 12 inches. Pony walls shall be constructed with 6-mil poly if the perimeter walls of the containment area do not extend to the deck above. The work area(s) shall be placed under negative pressure as outlined in this specification throughout the work period.
- D. To permit the inspector to view the majority of the work area, the Contractor shall provide easily accessible viewing ports from the clean space into each work area. Viewing ports must be a minimum of 2' x 2', clear-see-through plastic with no scratches, tape or glue marks.

- E. Pressure differential recorders with strip charts are required to monitor the pressure differential in the work area. The recorders must be calibrated prior to arriving on site and shall be recalibrated monthly throughout the project. Recalibration shall be performed by qualified technicians following the procedures outlined by the manufacturers. Provide documentation of calibration before beginning work and monthly thereafter.
- F. A remote decontamination unit may be used during work conducted in critical barrier containments and in work areas where mini-enclosures are used. The unit shall be located immediately outside the work area and shall contain a wash down station.
- G. All water from the decontamination units shall be filtered to the technically feasible limit but not more than five (5) microns before disposal. In addition, the Contractor shall comply with all current local, state and federal codes relating to waste water release.
- H. Contractor shall construct an equipment decontamination enclosure system consisting of a washroom, holding area and clean room separated by airlocks.
- I. Separate areas of the building required to remain in operation from areas of the building undergoing asbestos-related construction work by means of airtight barriers constructed with suitable wood or metal framing. Apply a minimum of 3/8 inch sheathing on the work and public sides of the barrier. Only fire-rated building materials shall be used.
- J. Approved fire extinguishers (Class ABC, multi-purpose, dry chemical type, rated: 4A; 60BC) shall be readily available to workers (maximum travel distance of 50 feet) inside and adjacent to work area(s). Personnel and emergency exits shall be clearly indicated on the inside of the containment area. The emergency exit plan shall be approved by the Environmental Consultant prior to the set up of any work areas.

3.03 PERSONNEL PROTECTION

- A. Informed Workers:
 - 1. All workers shall be informed of the hazards of asbestos and any other hazardous materials exposure. Workers shall also be instructed in the use and fitting of respirators, protective clothing, decontamination procedures, and all other aspects associated with the work.
- B. Personal Hygiene Practices:
 - 1. The Contractor shall enforce and follow good personal hygiene practices during the asbestos-related construction work. These practices will include but not be limited to the following: no eating, drinking, smoking or applying cosmetics in the work area. The Contractor shall provide a clean space, separated from the work area, for these activities.
 - 2. Workers shall remove street clothes in the clean room and put on a respirator and clean protective clothing before entering the work area. Upon exiting the work area, remove gross contamination from clothing before leaving the work area; proceed to the change room and remove

clothing except respirators; proceed to the shower; clean the outside of the respirator with soap and water while showering; remove respirator and thoroughly wash. Following showering, proceed directly to the clean room and dress in street clothes. Do not wear disposable clothing outside the decontamination enclosure system.

3. If data gathered by the Owner or Owner’s designated representative in areas adjacent to the work areas shows exposure to airborne asbestos or asbestos dust exceeding background levels, that area will become regulated and workers must wear protective clothing and approved respirators and must have a shower facility provided to them.

C. Respirators:

1. Establish a respiratory protection program as outlined by ANSI and required by Cal-OSHA. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH). Respirators selected must be approved by the Competent Person. Submit program for review a minimum of five (5) working days prior to the commencement of abatement activities.
2. Provide workers with approved and personally issued respirators with replaceable filters. Provide sufficient quantity of filters approved by NIOSH for use in asbestos environments so that workers can change filters as required by the manufacturer.
3. At a minimum, provide each employee with the following respiratory protection for each work phase:
 - a. Pre-cleaning, containment set-up, and containment removal work: NIOSH-approved, half-face respirators with HEPA cartridges.
 - b. Interior and exterior asbestos-related construction work: NIOSH-approved, half-face respirators with HEPA cartridges and organic vapor cartridges (as necessary).
4. At all times, respiratory protection selected shall, at a minimum, meet the requirements of the Table 1 below.

Table 1 – Respiratory Protection

<u>Airborne Concentration of Asbestos</u>	<u>Required Respirator</u>
Not in excess of 0.1 fibers/cc	Half-mask air purifying respirator equipped with high efficiency filters
Not in excess of 0.2 fibers/cc	Loose fitting hood or helmet powered air purifying respirator equipped with high efficiency filters Hood or helmet supplied air respirator operated in a continuous-flow mode

D. Protective Clothing:

1. Provide personnel exposed to asbestos with fire retardant disposable protective whole body clothing, head coverings, gloves, and foot coverings. Provide appropriate gloves to protect workers hands from exposure to hazardous materials. Make sleeves secure at the wrists and make foot coverings secure at the ankles with tape. Ensure that all personnel entering and leaving the work area follow this procedure. Suits shall be of adequate size to accommodate the largest employee. Foot covers may be part of the coveralls. Non-disposable footwear shall be left in the work area until it is decontaminated or disposed of at the completion of the job.
 2. Protective clothing will be worn inside the work area after the area passes pre-work inspection and shall remain in use until the area passes final clearance inspection.
- E. Eye Protection: Provide safety glasses or goggles to personnel removing or handling asbestos-containing materials and waste.
- F. Shower Requirements: When a shower is required, Contractor shall assure that all certified employees and visitors use protective equipment and the shower or wash down facility following each entry into the containment area after the start of the asbestos-related construction work.
- G. Emergency Precautions and Procedures:
1. Establish emergency and fire exits from the work area. Display necessary signage at exits and paths to exits with representative visual aids. A diagram of all emergency and fire exits shall be posted in a conspicuous area proximate to the entrance to each work area.
 2. The Contractor's supervisor/competent person shall be trained and certified in first aid and CPR, and be prepared to administer first aid to injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated without delay for decontamination. When an injury occurs, the Contractor shall implement fiber reduction techniques until the injured person has been removed from the work area.
 3. In the event of a loss of negative pressure to the work area, work shall stop immediately and entrances to the work area sealed tight. The Contractor shall also institute dust reduction controls until negative pressure is re-established to acceptable levels.

3.04 ASBESTOS REMOVAL

- A. Where feasible, all asbestos removal shall be accomplished utilizing manual removal methods.
- B. Until an exposure assessment has been performed, Contractor shall treat all employees as if they were exposed to asbestos above the Permissible Exposure Level (PEL) and shall provide the following:
1. Appropriate respiratory protection to each employee.
 2. Appropriate personal protective clothing and equipment.

3. Change areas and hand-washing facilities.

- C. The Contractor shall continuously apply water during asbestos-related construction work. The water shall be applied with a low-pressure fine spray to minimize airborne dust levels. All asbestos debris shall be immediately bagged following removal.
- D. Collect personal samples representative of a full shift including at least one sample for each job classification in each work area. Samples must be representative of the monitored employee's regular, daily exposure to asbestos.
- E. Employees must have proper training which includes the content of the asbestos standard; the specific nature of the operations which could result in exposure to asbestos above the PEL; the purpose, proper selection, fitting, use and limitations of respirators; the purpose of the medical surveillance program; purpose of engineering controls; content of compliance plans; and the employee's right of access to records.
- F. Asbestos-containing debris and contaminated water shall be cleaned from the work area at the end of each work shift. Contractor shall clean the work area using wet methods and HEPA vacuuming equipment.

3.05 REGULATED AREA MONITORING

- A. Prior to each work shift and continuously throughout the project, each containment and decontamination enclosure system shall be inspected and repaired as needed.
- B. Ambient airborne asbestos levels outside the work area shall not exceed 0.01 f/cc. If the airborne asbestos concentration outside the work area exceeds 0.01 f/cc, then the work must stop. Contractor must stop and operations reviewed and modified to reduce the airborne asbestos concentration to within the acceptable limits.

3.06 AIR MONITORING

- A. The purpose of any air monitoring that may be conducted by the Owner or Owner's designated representative will be to detect possible release of dusts emanating from the work areas.
- B. All asbestos air sampling shall comply with NIOSH 7400 method and OSHA REFERENCE METHOD.
- C. The Owner or Owner's designated representative reserves the right to perform and / or observe final clearance inspection and sampling.
- D. The Contractor shall be responsible for all personal air sampling. Daily sampling shall be conducted on 25% of the workers. Sample results shall be available on-site within 24-hours of sample collection. During the performance of any work in the contaminated work area, sufficient personnel breathing zone samples shall be taken to constitute representative sampling. These samples shall be taken each shift and for each distinct crew operation, and shall be used to verify adequacy of dust control and respiratory protection. Personal breathing zone air

sampling shall be in accordance with the Cal-OSHA asbestos in construction standard.

3.07 CLEARANCE INSPECTIONS

- A. The Owner or Owner's designated representative reserves the right to conduct visual inspections. Contractor shall notify the Owner or Owner's designated representative when the decontamination process in each containment area is complete. Evidence of debris will require additional clean up by the Contractor. Contractor shall be responsible for re-cleaning all areas found to be deficient.
- B. If the Owner or Owner's designated representative determines that the work area is sufficiently clean, the Contractor may proceed. If the Owner or Owner's designated representative determines that certain areas require additional cleaning, the Contractor shall re-clean the work area and request a second inspection of the recleaned area. All costs incurred by the Owner or Owner's designated representative for inspections required after the second inspection will be charged to the Contractor.
- C. Once the initial visual is passed, the Contractor shall remove all but the containment critical barriers.
- D. Following the visual inspection, the Contractor may provide a coating of non-diluted encapsulant in the work area.
- E. Asbestos Clearance Testing: At the completion of abatement activities, the Owner or Owner's designated representative may conduct clearance sampling. Clearance sampling shall not take place until all encapsulant is dry.

3.08 ASBESTOS CLEARANCE CRITERIA:

- A. Following asbestos-related construction work the Owner or Owner's designated representative may conduct air sampling. The clearance criteria are less than 0.01 fibers per cc by PCM and/or less than 70 structures per square millimeter.
- B. If the air samples do not pass the required clearance criteria, the area shall be recleaned and new samples shall be collected by the Owner or Owner's designated representative. The Contractor shall be responsible for all costs associated with re-sampling and re-analyses. This amount will be deducted by the Owner from the Contractor's final payment.
- C. The Owner or Owner's designated representative shall notify the Contractor in writing of acceptable of clearance sampling. The Contractor shall then remove all the remaining barriers in the work area.

3.09 ASBESTOS DISPOSAL

- A. It is the responsibility of the Contractor to determine current waste handling, labeling, transportation and disposal regulations for the work site and for each waste disposal landfill. The Contractor must comply fully with these Specifications, local, state, and federal regulations and provide documentation of the same. Ensure that polyethylene bags are sealed airtight. All bags shall be wet cleaned prior to removing them from the work area.

- B. Ensure all disposal containers are properly labeled according to 8 CCR 1529, 5194 (HAZCOM), 49 CFR 171-179 (USDOT), 40 CFR 61 Subpart M (NESHAP), and any local regulations and state regulations as required by this specification.
- C. All skim coat and waste generated from spall repair shall be disposed of as RACM.
- D. All other waste, if considered non-friable shall be disposed as asbestos-containing waste.
- E. Filter all wastewater to the technically feasible limit, but not more than five (5) microns before disposal. Comply with all current local, state and federal codes relating to waste water release. Any discharge shall be pre-approved by Owner.
- F. Waste that is properly labeled and double-bagged, may be temporarily stored in areas approved by the Owner. Areas must be made secure before storing the waste. Waste is not to remain in temporary storage area for longer than four (4) days before final load-out of materials.
- G. All waste shall be double-wrapped prior to transport from the site.
- H. All vehicles used to transport hazardous waste must be registered with the Department of Toxic Substances Control and display the proper registration and expiration stickers.
- I. All vehicles and containers used to transport waste are subject to inspection and approval of Owner prior to departure from site.
- J. Trucks must have an enclosed cargo area with a storage compartment that is fully lined with a minimum of one (1) layer of 6-mil polyethylene on the walls and two (2) layers on the floor. The driver of the vehicle must stop the vehicle in a safe location at least once during each two hours or one hundred miles of travel whichever is less and inspect the contents of the shipment. At the time of inspection if any form of binding is found to be loose the driver shall immediately take action to remedy the situation for safe transportation.
- K. Contractor shall not throw bags into the truck in a way that may cause the bags to burst open.
- L. Contractor shall provide at minimum one (1) day advance notification to the Owner when signatures are required on manifest(s). The Contractor shall ensure that the Hazardous Waste Manifest is correctly filled out. The Contractor shall give the appropriate copies to the Owner and shall also instruct the Owner in writing that they must send the appropriate copy to the Department of Toxic Substances Control.
- M. If a debris box is used, the Contractor shall make all necessary arrangement with the Owner including obtaining all appropriate permits.
- N. Contractor is responsible for all coordination with the waste disposal site and with the waste hauling company.
- O. Debris box for hazardous waste shall be fully lined with a double layer of polyethylene sheeting and must be locked at all times when unattended.

- P. Debris box shall be constructed with minimum 20-gauge steel with no windows or openings other than the door. The door of the container shall have a secure cover on the locking device with access to the lock only at the keyhole. Once the debris box is filled and the manifest is signed, Contractor must transport the debris box off the job site.
- Q. Disposal shall be in a landfill that meets EPA requirements. Do not throw bags into landfills in a way that may cause the bags to burst open.

END OF SECTION

ATTACHMENT A
ASBESTOS WORK PLAN OUTLINE

In accordance with the contract documents and Cal-OSHA Asbestos in Construction Standard (Title 8 CCR 1529), the Contractor is required to prepare a written, site-specific Compliance Plan, and submit to the Owner for approval prior to start of work. This plan is required for the contractor to meet Cal-OSHA requirements as well as the contract documents, and shall describe work procedures and control methods that will protect the Owner's facilities and the environment.

I. Location of Work:

The work to be completed under this work plan will be completed at:

(Building name)

(Location within building)

Previous asbestos inspections or surveys have found that asbestos-containing materials are present at the following locations:

(List all materials and locations to assure the Owner and the Contractor are aware of all asbestos-containing materials locations)

II. Description of Work:

Describe the anticipated work scope, including:

A. Asbestos removal

B. Asbestos disturbance work

C. Any other activities that will or may result in worker exposures to asbestos

III. Schedule:

Phase/Task

Anticipated Date(s)

Mobilization

Set-up of work area(s), containments

Asbestos-related construction

Final Cleaning

Visual Inspection

Final Clearance (visual and sampling)

Teardown

Demobilization

The competent person, _____, will conduct worksite visual inspections on a daily basis, or more often as necessary.

IV. Equipment and Materials

List all equipment and materials to be used, such as the following:

HEPA Vacuums

Scrapers

Power saws

Pry bars

Cutting shears

Other hand tools

Negative air filtration units

Manometers

Shower facilities

Airless sprayers/compressors

Cleaning detergents

Solvents (must be approved by Owner)

Encapsulants/sealants	Roller/brushes
Gloves	Disposable coveralls
Respiratory protection	Eye & foot protection

V. Crew

List all workers and supervisors with emergency contact names and pagers.

Clearly identify the supervisor and competent person who have authority for all safety and health.

VI. Control Measures and Work Practices

Describe in a narrative format specific work procedures, exposure/contamination controls, and engineering controls. This description should include, but not be limited to, the following:

Location, size, layout & detail of work	Wet methods
Negative pressure enclosure	Local exhaust ventilation for tools
Respiratory protection	HEPA vacuums
Vacuum assisted blasting	General room ventilation
Containment (i.e., poly barriers)	Interface of trades involved
Methods to assure safety of bldg occupants	Pollution control
Removal method to reduce asbestos dust	

VII. Technology To Be Used In Meeting the PEL

List all or any specialized equipment to be used to meet the PEL.

VIII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection including types and manufacturers, which are anticipated for this project. Identify the phases of the project for which respirators will be required or likely to be required. List all personal protective equipment anticipated to be used on the project.

IX. Decontamination/Hygiene Facilities

Identify the types and locations of decontamination or hygiene facilities to be used on this project. Specify use of disposable towels, soap, hot and cold water, and other supplies. Specify the required use of the facilities, including use of the facilities prior to eating, drinking, smoking and before leaving the project site. Describe handling or treatment of asbestos-contaminated solid waste and wastewater.

X. Air Monitoring Data

Identify general worker air monitoring protocols (must include 25% of personnel daily) to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for analysis, pump calibration techniques, etc. Identify the competent person responsible for conducting personal air monitoring.

XI. Medical Surveillance Program

Describe the Contractor's medical surveillance program currently in place. Identify the physician or medical provider firm currently handling the medical surveillance needs and include name and phone number.

XII. Worker Training

Provide the Contractor's Worker Training Certificates per the specifications.

XIII. Waste

Describe how all waste on this project will be packaged, waste characterized, labeled, stored, transported, manifested and disposed.

XIV. Notification

Describe all arrangements made on multi-employer work sites to inform affected employers about the asbestos project. Attach copies of any notifications.

XV. Date Prepared and Prepared By (signature, name and title)

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

ACC Environmental Consultants
Stephen Jackson
7977 Capwell Dr., Suite 100
Oakland, CA 94621

Client ID: 1117
Report Number: B311885
Date Received: 12/30/20
Date Analyzed: 01/05/21
Date Printed: 01/05/21
First Reported: 01/05/21

Job ID/Site: 3029-295.00 - Limited Asbestos, PCB and Lead Survey, OUSD Fremont HS,
Library, Fremont High School, 4160 Foothill Blvd.

SGSFL Job ID: 1117
Total Samples Submitted: 27
Total Samples Analyzed: 27

Date(s) Collected: 12/29/2020

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
MI-1-1	12371531						
Layer: Red Cementitious Material			ND				
Layer: Grey Cementitious Material			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							
MI-1-2	12371532						
Layer: Red Cementitious Material			ND				
Layer: Grey Cementitious Material			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							
WP-2-1	12371533						
Layer: Light Grey Non-Fibrous Material		Chrysotile	1%				
Total Composite Values of Fibrous Components:		Asbestos (Trace)					
Cellulose (Trace)							
WP-2-2	12371534						
Layer: Light Grey Non-Fibrous Material		Chrysotile	1%				
Total Composite Values of Fibrous Components:		Asbestos (Trace)					
Cellulose (Trace)							
CO-3-1	12371535						
Layer: Light Grey Cementitious Material			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							
CO-3-2	12371536						
Layer: Light Grey Cementitious Material			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							
CO-3-3	12371537						
Layer: Light Grey Cementitious Material			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							

Client Name: ACC Environmental Consultants

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Date Printed: 01/05/21

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PL-4-1	12371538						
Layer: Tan Plaster			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components: Cellulose (Trace)		Asbestos (ND)					
PL-4-2	12371539						
Layer: White Plaster			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components: Cellulose (Trace)		Asbestos (ND)					
PL-4-3	12371540						
Layer: White Plaster			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components: Cellulose (Trace)		Asbestos (ND)					
PL-4-4	12371541						
Layer: White Plaster			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components: Cellulose (Trace)		Asbestos (ND)					
PL-4-5	12371542						
Layer: White Plaster			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components: Cellulose (Trace)		Asbestos (ND)					
CK-5-1	12371543						
Layer: White Non-Fibrous Material			ND				
Layer: Paint			ND				
Layer: Brown Fibrous Material			ND				
Total Composite Values of Fibrous Components: Cellulose (20 %)		Asbestos (ND)					
CK-5-2	12371544						
Layer: White Non-Fibrous Material			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components: Cellulose (Trace)		Asbestos (ND)					
JC-6-1	12371545						
Layer: White Drywall			ND				
Layer: White Joint Compound			ND				
Layer: White Tape			ND				
Layer: White Joint Compound			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		Asbestos (ND)					

Client Name: ACC Environmental Consultants

Report Number: B311885

Date Printed: 01/05/21

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
JC-6-2	12371546						
Layer: White Drywall			ND				
Layer: White Joint Compound			ND				
Layer: White Tape			ND				
Layer: White Joint Compound			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (20 %)	Fibrous Glass (10 %)						
JC-6-3	12371547						
Layer: White Drywall			ND				
Layer: White Joint Compound			ND				
Layer: White Tape			ND				
Layer: White Joint Compound			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (20 %)	Fibrous Glass (10 %)						
MI-7-1	12371548						
Layer: White Woven Material			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (95 %)							
SU-8-1	12371549						
Layer: Grey Cementitious Material			ND				
Layer: Orange Cementitious Material			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							
SU-8-2	12371550						
Layer: Grey Cementitious Material			ND				
Layer: Orange Cementitious Material			ND				
Layer: Paint			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							
SU-8-3	12371551						
Layer: Grey Cementitious Material			ND				
Layer: Orange Cementitious Material			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							
SU-8-4	12371552						
Layer: Grey Cementitious Material			ND				
Layer: Orange Cementitious Material			ND				
Total Composite Values of Fibrous Components:		Asbestos (ND)					
Cellulose (Trace)							

Client Name: ACC Environmental Consultants

Report Number: B311885

Date Printed: 01/05/21

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
SU-8-5	12371553						
Layer: Grey Cementitious Material			ND				
Layer: Orange Cementitious Material			ND				
Total Composite Values of Fibrous Components: Cellulose (Trace)		Asbestos (ND)					
VB-9-1	12371554						
Layer: Black Fibrous Material			ND				
Total Composite Values of Fibrous Components: Cellulose (95 %)		Asbestos (ND)					
VB-9-2	12371555						
Layer: Black Fibrous Material			ND				
Total Composite Values of Fibrous Components: Cellulose (95 %)		Asbestos (ND)					
MI-10-1	12371556						
Layer: Red Cementitious Material			ND				
Total Composite Values of Fibrous Components: Cellulose (Trace)		Asbestos (ND)					
MI-10-2	12371557						
Layer: Red Cementitious Material			ND				
Layer: Light Grey Cementitious Material			ND				
Total Composite Values of Fibrous Components: Cellulose (Trace)		Asbestos (ND)					



Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Analytical results and reports are generated by SGS Forensic Laboratories (SGSFL) at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by SGSFL to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by SGSFL. The client is solely responsible for the use and interpretation of test results and reports requested from SGSFL. SGSFL is not able to assess the degree of hazard resulting from materials analyzed. SGS Forensic Laboratories reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. All samples were received in acceptable condition unless otherwise noted.



BULK SAMPLE CHAIN-OF-CUSTODY

Report to:	Stephen Jackson (OAK)	Email:	sjackson@accenv.com	Phone:	Stephen: (510) 512-8320
Project Name:	Limited Asbestos, PCB, and Lead Survey - OUSD Fremont HS, Library				
Project Address:	Fremont High School: 4160 Foothill Blvd			Project Number:	3029-295.00
Collected by:	Mercede Ramjerdi: CSST #18-6266; LRC (I/A)-00005009			Date Collected:	12/29/2020
Analysis:	PLM: Standard	Stop at 1st Positive?		Turnaround Time:	Standard (3-5 Day)
Comments:					

Sample ID	Material Size-Color-Pattern-Material-Post Description	Material Location [Quantity] Building or Floor: Area(s) - Component	Sample Location Area - Component	Quantity			
MI-1-1 MI-1-2	Red Terra Cotta (Concrete Filler)	All Floors: Exterior -Partial Exterior Walls	1. Ground Level, Exterior- W Wall 2. Ground Level, Exterior - W Wall	PLM Bulk PLM Bulk			
WP-2-1 WP-2-2	Grey Window Glazing Compound	All Floors: Exterior -Window Frames /Glass	1. 2F, Exterior - S Window 2. Ground Level, Exterior- W Window	PLM Bulk PLM Bulk			
CO-3-1 CO-3-2 CO-3-3	Exterior Concrete	All Floors Exterior -Walls	1. 1F, Exterior- S Wall 2. 1F, Exterior - S Wall 3. 1F, Exterior - W Wall	PLM Bulk PLM Bulk PLM Bulk			
PL-4-1 PL-4-2 PL-4-3	Interior Plaster	All Floors: All Areas -Partial Walls	1. 2F, Library - W Wall 2. 1F, Office 2112 - W Wall 3. 1F, Office 2114 - W Wall	PLM Bulk PLM Bulk PLM Bulk			
PL-4-4 PL-4-5	Same As Above	Same As Above	4. 1F, Office 2116 - S Wall 5. 1F, Office 2116 - W Wall	PLM Bulk PLM Bulk			
CK-5-1 CK-5-2	White Interior Caulking	1st Floor: All Areas -Partial Window Frames/Walls	1. Office 2112 - W Wall 2. Office 2116 - S Wall	PLM Bulk PLM Bulk			
JC-6-1 JC-6-2 JC-6-3	Wallboard With Joint Compound	1st Floor: All Areas -Partial Walls	1. Office 2112: W Wall 2. Office 2114: W Wall 3. Office 2116 - S Wall	PLM Bulk PLM Bulk PLM Bulk			
MI-7-1	White Window Rope	1st Floor: All Areas -Partial Windows	1. Office 2114 - W Window	PLM Bulk			
SU-8-1 SU-8-2 SU-8-3	Orange/Grey Exterior Stucco	All Floors: Exterior -Walls	1. 2F, Exterior- S Wall 2. Ground Level, Exterior- S Wall 3. Ground Level, Exterior- W Wall	PLM Bulk PLM Bulk PLM Bulk			
SU-8-4 SU-8-5	Same As Above	Same As Above	4. Ground Level, Exterior- W Wall 5. Ground Level, Exterior- W Wall	PLM Bulk PLM Bulk			
VB-9-1 VB-9-2	Black Vapor Barrier	All Floors: Exterior -Partial Walls	1. Ground Level, Exterior- S Wall 2. Ground Level, Exterior - W Wall	PLM Bulk PLM Bulk			
MI-10-1 MI-10-2	Red Brick (Concrete Filler)	All Floors: Exterior -Partial Walls	1. Ground Level, Exterior- W Wall 2. Ground Level, Exterior- W Wall	PLM Bulk PLM Bulk			
Released:	Mercede Ramjerdi	Signature:		Date:	12/29/2020	Time:	Fedex
Received:		Signature:		Date:	DEC 30 2020	Time:	
Lab Info:	SGS Forensic Laboratories: 3777 Depot Road #409, Hayward, California 94545 - (510) 887-8828						

www.accenv.com

Northern California: 7977 Capwell Drive, Suite 100, Oakland, California 94621 • (510) 638-8400 • Fax (510) 638-8404
 Southern California: 1055 Wilshire Boulevard, Suite 1450 • Los Angeles, California 90017 • (213) 353-1240 • Fax (213) 353-1244

SECTION 02090 – LEAD-RELATED CONSTRUCTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Examine all other Sections of the Specifications for requirements therein affecting the work of this Section of the Specifications.

1.02 COMPLIANCE AND INTENT

- A. The Contractor is responsible for repair, to the satisfaction of the Owner, of surfaces not scheduled for demolition that become damaged as a result of the work. All unscheduled repair work shall be at no increase to contract price.
- B. This project deals with construction activities that will impact lead-based and lead-containing coatings. It is necessary for the Contractor to coordinate all lead-related construction work with the specifications. During all work, provide monitoring and worker protective equipment in accord with the California Occupational Safety and Health Administration (Cal-OSHA) and as required by this specification. Where there is conflict, the most stringent requirement shall apply.
- C. The work covered by this specification includes the handling, removal, preparation, encapsulation and proper disposal of lead-containing materials. All lead-containing materials to be removed shall be removed and disposed of according to all federal, state and local regulations. All painted surfaces to be encapsulated will require application of encapsulant in accordance with all federal, state and local regulations as well as with manufacturer guidelines. The Contractor shall determine if additional hazardous materials will be impacted by the scope of the abatement work. The cleanup of any incidental lead found in areas undergoing lead-related construction work that become separated from the buildings during the dismantling process are part of the work.
- D. The workers completing lead-related construction and/or encapsulation shall have received lead training in accordance with Cal-OSHA and CDPH requirements.
- E. Furnish all labor, materials, facilities, equipment, services, employee training, medical monitoring, permits and agreements necessary to perform the work required for lead-related construction in accordance with this specification.
- F. Comply with all federal, state, and local regulations pertaining to lead-related construction, storage, transportation and disposal; employee health and safety; Contractor certifications; and all licenses, permits, and training.
- G. Work on the premises shall be confined to areas designated in the Contract Documents. Materials and equipment shall be stored within areas designated by

the Owner. Should additional space be required, the Contractor shall request permission for additional space and shall adequately safeguard occupants from associated health and safety hazards.

- H. Perform all work specified herein with competent persons trained, knowledgeable and qualified in state-of-the-art techniques relating to lead-related construction, handling, and the subsequent cleaning of contaminated areas.
- I. During lead-related construction activities, the Contractor shall protect against contamination of soil, water, plant life, and adjacent building areas, and shall ensure that there is no airborne release of dusts. The Owner may collect air and/or wipe samples in the building and in adjacent areas to evaluate the Contractor's performance. Evidence of settled dust or airborne levels of contaminants above background will require the implementation of additional controls at no increase to contract price.
- J. It is the Contractor's responsibility to determine the quantities of lead-related construction prior to commencement of the project. The Contractor shall conduct a site visit to determine exact locations of materials that will be impacted. This section provides appropriate protocols for handling and disposal of lead-containing materials. All lead-containing materials shall be handled according to the procedures outlined in this specification. If additional suspect lead-containing materials are discovered during the course of the work, immediately notify the Owner and/or the Owner's Designated Representative.
- K. The work of this section shall be performed by an entity that holds a current, valid contractor's license issued by the California State Contractor's Licensing Board (SCLB). Display a copy of CSLB license in a visible place at the job-site.
- L. Lead-containing materials removed during the work shall be disposed of in an approved manner complying with all applicable federal, state, and local regulations. Appropriate waste manifests or letters of salvage shall be furnished to the Owner thereby limiting the Owner's liability for improperly salvaged items. Materials are conveyed to the Contractor "as is," without any warranty, expressed or implied, including but not limited to, any warranty to marketability or fitness for a particular purpose, or any purpose. The Owner or the Owner's Designated Representative shall approve the waste disposal site(s) prior to disposal.
- M. Perform appropriate Total Threshold Limit Concentration (TTLC), Soluble Threshold Limit Concentration (STLC) and Toxicity Characteristic Leaching Procedure (TCLP) testing for lead containing materials including (paint, ceramic tile, painted building debris) as required by this specification, by the regulations, and the selected landfill(s). All testing shall be done in the presence of the Owner or the Owner's Designated Representative. Chain-of-custody forms shall be provided to the Owner or the Owner's Designated Representative within one (1) day following sample delivery to the laboratory. Provide laboratory reports to Owner within 24-hours after receipt by Contractor.

1.03 DEFINITIONS

- A. The following definitions pertain to work of this section.

1. Abrasive Removal: Any form of sanding, grinding or high pressure media blasting utilized to remove coatings or prepare a surface for encapsulation.
2. Action Level: Employee exposure without regard to the use of respirators, to an airborne concentration of 30 micrograms per cubic meter of air ($30 \mu\text{g}/\text{m}^3$) calculated as an 8-hour time-weighted average (TWA).
3. Airlock: A system for permitting ingress and egress with minimum air movement between a contaminated area and uncontaminated areas. Typically consists of two curtained or gasketed doorways separated by a distance of at least six feet such that one passes through one doorway into the airlock, allowing the doorway to close off the opening. This airlock must be maintained in uncontaminated condition at all times.
4. Area Monitoring: Sampling of airborne lead concentrations within the work area and outside the work area. Sampling shall represent airborne concentrations that may reach the breathing zone.
5. Authorized Visitor: Designated employees or consultants for the Owner and representatives of any federal, state or local regulatory or other agency having jurisdiction over the project.
6. Baseline: Refers to the background levels of lead monitored before work activities.
7. Breathing Zone: A hemisphere forward of the shoulders and head with a radius of approximately six to nine inches.
8. Breach: A rift or gap in the critical or secondary barriers that allow egress of air from the containment to outside, or vice versa.
9. Cal-OSHA: State of California, Occupational Safety & Health Administration.
10. CDPH: California Department of Public Health
11. Chain-of-Custody: A legal concept involving documentation of the physical possession of a sample(s) from the moment it is collected, transported, analyzed, and ultimately stored in an archive.
12. Change Rooms: Refers to the two chambers in the decontamination area used to change into and out of protective clothing.
13. Certified Industrial Hygienist (CIH): A person certified by the American Board of Industrial Hygiene.
14. Clean Room: An uncontaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of workers' street clothes and protective equipment.

15. Competent Person: One who is capable of identifying existing and predictable hazards and who has the authority to take prompt corrective measures to eliminate them.
16. Critical Barrier: A unit of temporary construction that provides the only separation between the work area and an adjacent potential occupied space. This includes the decontamination unit, perimeter walls, ceilings, penetrations and any temporary critical barriers between the work area and the uncontaminated environment.
17. CSLB: Contractors State Licensing Board
18. Decontamination Area: Area which is constructed to provide the means for workers to store clothing, equipment and other articles, and to properly remove contamination upon concluding work activities that result in exposure to these hazardous materials.
19. DOP: Dioctylphthalate, the challenge aerosol used to perform on-site leak testing of HEPA filtration equipment.
20. DOT: Federal Department of Transportation.
21. DOSH: Division of Occupational Safety & Health (see also Cal-OSHA)
22. Decontamination Unit: Refers to system of airlocks used to decontaminate personnel, waste bags, equipment, etc. when exiting the work area. A decontamination unit shall be set up for each containment area.
23. Demolition: The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.
24. Equipment Decontamination Enclosure System: A decontamination enclosure system for materials and equipment, typically in a designated area of the work area, and including a washroom, a holding area, and an uncontaminated area.
25. Equipment Room: A contaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment. The equipment room shall be kept clean from lead-containing debris at all times.
26. Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.
27. Fixed Object: A unit of equipment or furniture in the work area that cannot be removed from the work area.
28. HEPA: High Efficiency Particulate Air filter capable of filtering out airborne particulate 0.3 microns or greater in diameter at 99.97 percent efficiency.
29. Lead: Toxic metallic element of atomic number 82, or any other materials, substances or compounds that may contain lead. Note for

metal painted surfaces lead is often found in combination with chromates. For the purposes of this specification, lead also refers to lead-chromate paints.

30. Lead Hazardous Waste: Paint, sludge, debris or cleaning materials are to be treated as a hazardous waste if laboratory results indicate a lead (Pb) concentration of 5 milligrams per liter (mg/l) or greater using the EPA approved Toxicity Characteristic Leaching Procedure (TCLP) test. The waste will also be classified as hazardous waste if the Total Threshold Limit Concentration (TTLC) of measured lead is greater than 350 mg/kg or if the Soluble Threshold Limit Concentration (STLC) of measured lead is greater than or equal to 5 mg/l.
31. Manifest: The document authorized by both Federal and State authorities for tracking the movement of ACMs.
32. Movable Object: A unit of equipment or furniture in the work area that can be removed from the work area (e.g., smoke detectors, lights, etc.)
33. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere, and negative during inhalation in relation to the air pressure of the outside atmosphere.
34. Negative Pressure: Air pressure lower than surrounding areas, generally caused by exhausting air from a sealed space (work area).
35. NIOSH: National Institute for Occupational Safety and Health: Sets test standards, analytical methods, and certifies performance of various respirator designs (research institute within Federal OSHA).
36. NIST: National Institute of Standards and Technology: Administers the NVLAP Program.
37. Permissible Exposure Limits (PEL): An eight-hour time weighted average concentration of 50 $\mu\text{g}/\text{m}^3$.
38. Personal Monitoring: Sampling for lead concentrations within the breathing zone of an employee.
39. Powered Air Purifying Respirator (PAPR): A full-face piece respirator that has the breathing air powered to the wearer after it has been purified through a filter.
40. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
41. Remodel: Replacement or improvement of an existing building or portion thereof where exposure to lead may result. Remodel includes, but is not limited to, installation of materials, demolition, cutting, patching, and removal of building materials.

42. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.
43. Shower Room: A room between the clean room and the equipment room in the work decontamination enclosure system. This room contains hot and cold or warm running water and soap suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.
44. Soluble Threshold Limit Concentration (STLC): A material is considered as hazardous waste if laboratory test result indicate Soluble Threshold Limit Concentration of measured lead are greater than or equal to 5 milligrams per liter (mg/l).
45. Supervisor: An individual who typically fulfills the duties of “supervisor” as defined by Title 8 CCR 1532.1. This individual must supply documentation lead training in accordance with Cal-OSHA requirements or CDPH requirements, as applicable. The supervisor must be on-site during all lead-related construction work.
46. Toxicity Characteristic Leaching Procedure (TCLP): Test developed by U.S. Environmental Protection Agency (USEPA) to simulate landfill conditions and the potential for a waste to leach hazardous materials (40 CFR 261 - Appendix 2).
47. Total Threshold Limit Concentration (TTLC): A material is considered as hazardous waste if laboratory test result indicate Total Threshold Limit Concentration of measured lead are greater than or equal to 350 milligrams per kilogram (mg/kg).
48. Visible Emissions: Any emission containing particulate material that is visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
49. Visual Inspection: A visual inspection by Environmental Consultant, of the work area under adequate lighting to ensure that the work area is free of visible debris and dust.
50. Washroom: A room between the work area and the holding area in the equipment decontamination enclosure system equipped with water for decontamination of equipment and sealed waste containers. The washroom or shower room comprises one airlock.
51. Water Filtration: Refers to water filtration to as small a particulate size as technically feasible, but not more than 5 microns.
52. Wet Cleaning: The process of eliminating lead contamination from building surfaces and objects by using cloths, mops, HEPA vacuuming, or other cleaning utensils dampened with amended water and afterward thoroughly decontaminated or disposed of as lead contaminated waste.
53. Work Area: The area where lead-related construction work is performed and that is defined or isolated to prevent the spread of lead dust or

debris, and entry by unauthorized personnel. Work area is a regulated area as defined by Title 8 CCR 1529.

54. Zinc Protoporphyrin (ZPP) Test: Biological test for lead-exposure that measures the amount of zinc protoporphyrin in blood.

1.04 SCOPE OF WORK

- A. It is assumed that all interior and exterior painted surfaces, unless otherwise noted, contain detectable concentrations of lead. The lead-related construction work includes, but is not limited to, any work activity, which may result in an exposure to lead. Laboratory reports for limited lead in paint testing is attached.
- B. Demolition of painted surfaces will impact lead-based and lead-containing paint.
- C. Lead paint will be removed from building components as necessary to accommodate work by others. Coordinate all work with project team, plans and specifications.
- D. Stabilization of painted surfaces not scheduled for removal is required. Coordinate all work with project team, plans and specifications.
- E. All activities disturbing lead-containing paint (drilling, screwing, sanding, grinding, etc.) is covered as part of this section. All contractors disturbing paint shall comply with this section.
- F. The Contractor is responsible for proper handling, personnel monitoring, personnel protection, and disposal of lead paint construction debris. It is the Contractor's responsibility to determine the required testing protocols for lead-containing materials prior to disposal.
- G. Contractor shall conduct personal monitoring and provide workers with appropriate personal protective equipment if necessary. All work shall be conducted in a manner that does not release lead dust to the surrounding areas.
- H. The Contractor is responsible for conformance with all applicable regulations, including, but not limited to, CAL/OSHA Worker Protection, CAL/EPA Environmental Protection requirements, and the California Department of Public Health (CDPH).

1.05 REFERENCES

- A. The publications listed below form a part of this specification by reference. The publications are referred to in the text by basic designation only. If there is a conflict between any of the listed regulations or standards, then the most stringent or restrictive shall apply.
- B. American National Standards Institute (ANSI) and American Society for Testing and Materials (ASTM)
 - 1. ANSI Z9.2, 1979 (R 1991), Fundamentals Governing the Design and Operation of Local Exhaust Systems
 - 2. ANSI Z87.1, 2003, Occupational and Educational Eye and Face

Protection

3. ANSI Z88.2 1992, Respiratory Protection
 4. ANSI Z89.1, 1986, Requirements for Protective Headgear for Industrial Workers
 5. ANSI Z41, 1999, Personal Protection – Protective Footwear
 6. ANSI Z88.6, 1984, Respiratory Protection – Respiratory Use Physical Qualifications for Personnel
 7. ASTM C 732, 1982 (R 1987) Aging Effects of Artificial Weathering on Latex Sealants
 8. ASTM D 522, 1993 (Rev. A) Mandrel Bend Test of Attached Organic Coatings
 9. ASTM D 1331, Solutions of Surface-Active Agents
 10. ASTM D 2794, 1993 Resistance of Coatings to the Effects of Rapid Deformation (Impact)
 11. ASTM E 84, 1991 (Rev. A) Surface Burning Characteristics of Building Materials
 12. ASTM E 96, 1994 Water Vapor Transmission of Materials
 13. ASTM E 119, 1988 Fire Tests of Building Construction and Materials
 14. ASTM E 736, 1992 Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- C. California Assembly Bills (CAB)
1. CAB 040, Yearly Registration of Contractors
- D. California Code of Regulations (CCR)
1. CCR ESO, Electrical Safety Orders, Chapter 4, Subchapter 5
 2. CCR 1523, Illumination
 3. CCR 1532.1, Lead in the Construction Industry
 4. CCR 1531, Construction Respiratory Protective Equipment
 5. CCR 3203, Injury and Illness Prevention Program
 6. CCR 3204, Access to Employee Exposure and Medical Records
 7. CCR 3220, Emergency Action Plan
 8. CCR 3221, Fire Prevention Plan
 9. CCR 5144, Respiratory Protection Equipment Standard
 10. CCR 5194, Hazard Communication Standard
 11. CCR 6003, Accident Prevention Signs

12. Title 22, Division 4, Minimum Standards for Management of Hazardous and Extremely Hazardous Waste

- E. California Department of Public Health (CDPH) Title 17
 1. Commencing with Division 1, Chapter 8
- F. California Health and Safety Code (CHSC)
 1. CHSC 20
Division 20,
- G. California Labor Code (CLC)
 1. CLC DIVISION 5, Part 1, commencing with 6300
- H. California Propositions (CP)
 1. CP 65, Proposition 65
- I. California State Board of Equalization (CSBE)
 1. CSBE ETU, Excise Tax Unit
- J. California State License Board (CSLB)
 1. CSLB CBPC, California Business and Professional Code Sections 7058.5 and 7058.7, "Certification"
- K. Code of Federal Regulations (CFR)
 1. 29 CFR 1910.134, Respiratory Protection
 2. 29 CFR 1910.141, Sanitation
 3. 29 CFR 1910.145, Accident Prevention Signs and Tags
 4. 29 CFR 1926.21, Safety Training and Education
 5. 29 CFR 1926.55, Gases, Vapors, Fumes, Dusts, and Mists
 6. 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response
 7. 29 CFR 1926.59, Hazard Communication
 8. 29CFR 1910.1000, Air Contaminants
 9. 29 CFR 1926.62, Lead
 10. 40 CFR 260, Hazardous Waste Management Systems: General
 11. 40 CFR 745, Lead; Requirements for Lead-Based Paint Activities
- L. U.S. Department of Housing and Urban Development (HUD)
 1. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing

- M. Underwriters Laboratories, Inc. (UL)
 - 1. UL 586-96, 1996 Test Performance of High-Efficiency Particulate Air Filter Units

1.06 SUBMITTALS PRIOR TO START OF WORK

- A. The reviews by the Owner or Owner's designated representative are intended to be only for general conformance with the requirements. The Owner or the Owner's designated representative assumes no responsibility for permits, licenses, notices, materials and methods, equipment or temporary construction required to execute the work described in this Section of the Specification or in other Sections of the Specification or in other documents included in the contract documents.
- B. Before commencing lead-related construction work, submit the following for review by the Owner or Owner's designated representative:
 - 1. Provide a detailed lead-related construction work plan that follows Attachment A – Lead Work Plan Outline.
 - 2. Provide a lead site safety plan prior to project initiation. The site safety plan shall deal with, at a minimum: site safety and health hazards; contaminant release incidents; control of water leakage or discharge within and/or from the work area; medical emergency; Contractor's internal administrative and inspection procedures; earthquakes and/or fire emergency procedures; protocol for responding to complaints or questions from interested parties; 24-hour emergency telephone numbers for company officers with authority to respond to emergencies.
 - 3. Provide a Lead Compliance Plan as required by Title 8 CCR 1532.1.
 - 4. Supervisor (as defined by Title 8 CCR 1532.1): Demonstrate education and specialized training with successful completion of CDPH examination.
 - 5. Workers: Demonstrate education and specialized lead training in accordance with Cal-OSHA and CDPH requirements.
 - 6. RRP Certification: Demonstrate current RRP Firm Certification and Employee Certification for all RRP compliant work.
 - 7. Submit current certificates (less than 11 months) signed by each employee and trainer that the employee has received proper training in the handling of materials that contain lead. Include documentation showing that the worker understands the following; health implications and risks involved, the use and limits of the respiratory equipment to be used, and the results of monitoring of airborne quantities of lead concerning health and respiratory equipment.
 - 8. Proof of Respirator Fit Testing: Provide proof of respirator fit testing. Fit testing records must be less than eleven (11) months old and document

- testing on the type of respiratory protective equipment used for this project. Fit testing records must be signed by the Competent Person.
9. Foreman Training: Submit evidence that the foreman to be used on the job fulfills the qualifications detailed in this specification and has experience in similar jobs.
 10. Medical Examinations: Submit evidence signed by a physician that each employee used on the job has received an appropriate medical examination as detailed in Title 8 CCR 1532.1. The submitted document must be less than eleven (11) months old.
 11. Biological Monitoring: Submit blood lead testing results <30-days old for each employee.
 12. Written Notification to Fire and Police Departments: Provide documentation showing notification to local fire and police departments of the lead-related construction work three (3) days before commencement.
 13. Rental Equipment: When rental equipment is to be used in the work areas or to transport lead waste, the Contractor shall provide written notification regarding intended use of the rental equipment to the rental agency before use, with copies to the Owner or Owner's designated representative.
 14. Certificates of Compliance: Submit manufacturer's certification that vacuums, ventilation equipment, and other equipment required to contain lead dust conform to ANSI Z9.2. Submit results of onsite DOP testing of all HEPA-filtered ventilation equipment.
 15. Submit a statement of intent to dispose of all waste at a Landfill from the Owner's Pre-Approved list. Submit uniform hazardous waste manifests prepared, signed and dated by an agent of the landfill. The manifest must certify the amount of hazardous materials delivered to the landfill. The manifest must be provided to the Owner or Owner's designated representative within ten working days after delivery.
 16. Satisfactory proof that written notification has been provided to Cal-OSHA and CDPH, as appropriate.
 17. Licenses: Submit copies of state and local licenses and permits necessary to carry out the work of this contract.
 18. Notification of Other Contractors: If other contractors are working at the job site, before beginning any work the Contractor must inform all other contractors in writing regarding the location, nature, and requirements of the work areas.
 19. Safety Data Sheets/Specification Sheets: The Contractor shall submit Safety Data and Specification Sheets for all chemicals, encapsulants, etc. to be used for this project.

1.07 SUBMITTALS AT THE COMPLETION OF THE PROJECT

- A. Upon completion of on-site work, Contractor shall provide a detailed project summary that will include each of the items listed below. The project Summary shall be submitted and approved by the Owner's representative prior to acceptance of final pay request and shall include the following:
1. Copies of the Security and Safety Logs showing names of persons entering the workspace. The logs shall include date and time of entry and exit, supervisor's record of any accident (detailed description of accident).
 2. Emergency evacuations and any other safety or health incident.
 3. Copies of all Waste Manifests.
 4. Chain of Custody documentation and laboratory reports for all analysis performed.
 5. Personal air sample results.
 6. Pressure differential strip chart readings for each differential recording device on the site.
 7. Project Summary:
 - a. Contractor's name and address, certification number (CSLB) and Tax ID number.
 - b. Hazardous waste hauler certifications.
 - c. Name, address and registration number of hazardous waste hauler.
 - d. Laboratory performing analyses and results of waste characterization testing.
 - e. Contract number and name of project.
 - f. Specific inventory (including locations and approximate quantities) of the lead-containing materials removed or handled.
 - g. Number of employees working on the project.
 - h. Dates of commencement and completion of on-site work.
 - i. Work method employed (i.e., poly drop sheets and barrier tape, mini-containment, full containment with negative air and decontamination enclosure system, etc.)
 - j. Name, location, telephone number and EPA registration of waste disposal site(s) used.
 - k. DOP testing results.

1.08 CONTRACTOR MONITORING

- A. The Owner or Owner's designated representative reserves the right to perform air sampling and wipe sampling in selected areas during the course of the project. Owner or Owner's designated representative reserves the right to stop work within in an area if in the course of performing monitoring, the Owner or Owner's designated representative observes instances of substantial non-conformance with this Section or other Sections of the Specification presenting health hazards to workers, the general public or the surrounding areas. Work shall not resume until the corrective measures have been enforced. Instances of substantial non-conformance shall include, but not be limited to, the following:
1. Activities or misconduct imperiling worker's safety and health.
 2. Airborne lead concentrations outside of the work area exceeding background or $1.5 \mu\text{g}/\text{m}^3$, whichever is greater.
 3. Loss of negative pressurization.
 4. Breaches in containment resulting in potential release of lead to non-work areas.
- B. The Environmental Consultant may perform air and/or wipe sampling inside and outside the work area during all phases of the work. The Contractor shall cooperate fully with the Consultant and ensure the cooperation of his workers during collection of air/wipe samples and work area inspections.
- C. When visual inspections or air monitoring are specified, the Contractor shall notify the Owner or Owner's designated representative in writing 24 hours in advance of the day and time when the Contractor will be ready for such inspections or monitoring. Such requests shall be initiated by the Contractor's Supervisor or Foreman indicating that the work area has been previously inspected and is ready for inspection/testing.
- D. Air monitoring generated by the Owner or Owner's designated representative shall not be used by the Contractor to represent compliance with regulatory agency requirements for monitoring of workers exposure to airborne lead, nor shall any other activity on the part of the Owner or Owner's designated representative be construed to meet the Contractor's compliance with applicable health and safety regulations.

PART 2 - PRODUCTS

2.01 SIGNS AND LABELS:

- A. Provide labeling in accordance with State and Federal EPA requirements. Provide the required signs, labels, warnings, placards or posted instructions for containers used to transport hazardous material to the landfill.
- B. Location of Caution Signs and Labels: Provide bilingual caution signs at all approaches to work areas in languages used by the Contractor's employees. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area.

- C. Where the treatment process is reasonably expected to impact any lead-containing materials:



LEAD WORK AREA

**MAY DAMAGE FERTILITY OR THE
UNBORN CHILD**

**CAUSES DAMAGE TO THE CENTRAL
NERVOUS SYSTEM**

DO NOT EAT, DRINK OR SMOKE IN THIS AREA

1. Postings shall be in English and Spanish, and in any language used by any of the Contractor's employees as the primary language of communication.

2.02 CHEMICAL STRIPPERS

- A. Unless approved in advance by the Owner or Owner's designated representative Dumond Chemical products are the products approved for chemical paint removal work.

2.03 ENCAPSULANTS

- A. Unless approved in advance by the Owner or Owner's designated representative Fiberlock Technologies products are the products approved for encapsulation work. These include:
- 1) Piranha Neutralizer
 - 2) Lead Safe Cleaner
 - 3) PowerBlock Primer
 - 4) Power Rust Stop
 - 5) Lead Barrier Compound (LBC), tinted per project requirements
 - 6) Lead Shield Lockdown (Clear)
- B. Average depth of penetration shall meet manufacturer's recommendations.
- C. Dry mil thickness of encapsulating systems shall be as indicated in the specific treatment instructions included in this specification, and as recommended by the manufacturer.
- D. Encapsulants can be applied only after meeting manufacturers requirements for surface preparation and adhesion testing from each type of surface. Results of all adhesion testing shall be documented with location and substrate information and submitted to the owner prior to proceeding with encapsulation in each area.
- E. All encapsulants should be applied by a journeyman painter with similar previous project experience who is also CDPH trained and certified.

2.04 PLASTIC SHEETING:

- A. Use fire-retardant (FR) polyethylene (poly) film.
 - 1. Thickness - 6-mil, minimum, NO EXCEPTIONS.
 - 2. Flame Resistance/Flame Spread Rate <25.
 - 3. Conforms to NFPA #701 and Tested in accordance with ASTM E-84.

2.05 TAPE, ADHESIVE, SEALANTS:

- A. Tape, 2" or wider, shall be capable of sealing joints of adjacent sheet of polyethylene and shall attach polyethylene sheet to finished or unfinished surfaces or similar materials. Tape shall be capable of adhering under dry and wet conditions, including use of amended water. Taping to critical or sensitive surfaces shall be completed using preservation sealing tape.
- B. Spray adhesive for sealing polyethylene to polyethylene shall contain no methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.
- C. Fire resistant sealants shall be compatible with concrete, metals, wood, etc. Sealant shall prevent fire, smoke, water and toxic fumes from penetrating. Sealant shall have a flame spread, smoke and fuel contribution of zero, and shall be ASTM and UL rated for 3 hours for standard method of fire test for fire stop systems.

2.06 STRIP CHART RECORDER(S):

- A. Where interior negative pressure work areas are required, each shall have a minimum differential pressure of 0.025 inches water gage at all times. Fluctuations below .025 inches of water column are unacceptable and may require temporary cessation of work until conditions are corrected.
- B. Multiple continuous circular chart recorder(s) shall be used to document the level of pressure difference between the containment space and all other spaces as deemed necessary by the Owner or Owner's designated representative. Defective or non-operating instrumentation may require temporary cessation of work until instrumentation is repaired or replaced.
- C. The strip chart recorder will be checked a minimum of four times per day by a person familiar with the operation. Each check shall be documented on the circular chart with a time and date notation and the initials of the person performing the check. A copy of the circular chart shall be submitted daily to the Owner or Owner's designated representative.
- D. Differential air pressure systems shall be in accordance with Appendix J of EPA's "Guidance for Controlling Asbestos-Containing Materials in Buildings, EPA 560/5-85-024. The Differential pressure system shall be continuously monitored by the Contractor using a recording instrument connected to an appropriate strip chart recorder. The recording instrument shall be connected to an audible alarm that will activate at a pressure differential of -0.025 inches water gauge air pressure.

2.07 VACUUM EQUIPMENT:

- A. All vacuum equipment used in the work area shall use HEPA filtration systems and be of the wet-dry type. The Contractor shall provide on-site independent DOP testing to document the effectiveness of the vacuum units. The test results shall be signed by the individual performing the testing.

2.08 LOCAL EXHAUST SYSTEM:

- A. Where containments are required, sufficient High Efficiency Particulate Absolute (HEPA) ventilation units shall be used to maintain the negative pressure in each interior work area at 0.025 inches of water column and a minimum of four (4) air changes per hour.
- B. The ventilation system shall remain in operation 24 hours a day until the work area has passed the specified clearance criteria. HEPA filtered air which is exhausted to maintain negative pressure shall be exhausted from the building at locations approved by the Owner or Owner's designated representative. Exhausted air shall not be near or adjacent to other building intake vents or louvers or at entrances to buildings. Other HEPA units shall operate within the enclosure to circulate air and control fiber counts.
- C. The Contractor shall provide on-site independent DOP testing to document the effectiveness of the air filtration units. The test results shall be signed by the individual performing the testing. Repeat testing if the unit or the air filtration units have been repaired or replaced. Repeat DOP testing after thirty days. Provide documentation to the Owner or Owner's designated representative with 24 hours of DOP testing.

2.09 RESERVE EQUIPMENT:

- A. Contractor shall have the following equipment on site: two reserve, functioning and DOP-tested HEPA Filter Vacuum Cleaning Units, two reserve and DOP-tested HEPA area filtration units for every four containments. Contractor shall also have sufficient polyethylene (poly), respirators, protective equipment, tape, tools, and decontamination enclosure systems for each work area.
- B. Provide authorized visitors, Owner, Consultants or other contractors requiring access to the work area with suitable protective clothing, headgear, eye protection, as described in this specification, whenever the visitor must enter the work area. The Contractor shall have available and maintain at all times a minimum of three (3) suits and other suitable protective equipment for this purpose. All protective equipment shall be new and for the exclusive use of visitors.
- C. The Contractor shall document that each visitor has been trained and fit-tested prior to entering a work area.

2.10 SCAFFOLDING:

- A. Scaffolding, as required to do the specified work, shall meet all applicable safety regulations and DOSH standards. A non-skid surface shall be furnished on all scaffold surfaces subject to foot traffic. Contractor must comply with Owner's and General Contractor's Fall Protection Requirements.

2.11 TRANSPORTATION EQUIPMENT:

- A. Transportation equipment, as required, shall be lockable and suitable for loading, temporary storage, transit and unloading of contaminated waste without exposure to persons or property. Any vehicle used to transport lead waste shall be properly registered with all applicable controlling agencies.

2.12 CONNECTIONS TO WATER SUPPLY:

- A. Contractor shall assure that all connections to the site's water system shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water shall not damage existing finishes or equipment.
- B. Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system in each work area. Provide fittings as required to allow for connection to existing wall hydrants or spouts.

2.13 OTHER TOOLS AND EQUIPMENT:

- A. The Contractor shall provide other suitable tools for the lead-related construction and disposal activities.
- B. Prohibited Equipment: The following equipment is prohibited from use on this project unless accepted in writing by the Owner or Owner's designated representative:
 - 1. High or low pressure water-blasting equipment for hosing of work areas.
 - 2. Vacuum-powered removal or collection equipment located outside the work area, such as a "Vacu-Loader".
 - 3. Gasoline, propane, diesel or other fuel powered equipment inside the building, unless previously approved in writing by the Owner or Owner's designated representative.
 - 4. Equipment that creates excessive noise or vibration that would affect the safety of the building or generate complaints from neighboring building occupants. No equipment shall exceed an A-weighted sound level of 85 dB as measured at 3 ft. from the radiating source without written permission of the Owner or Owner's designated representative.

5. Flammable solvents with a flash point below 140 degrees F or materials containing ethylene glycol ether, methylene chloride, ethyl chloroform (1,1,1-trichloroethane), or other hazardous substances.
6. Non-fire retardant polyethylene sheeting.
7. Polyurethane spray foam for application in fire-rated assemblies, including but not limited to penetrations into stairwells, mechanical rooms, electrical closets, rated floor-to-floor assemblies, etc.

PART 3 - EXECUTION

3.01 INITIAL AREA ISOLATION

- A. The Owner or the Owner's designated representative reserves the right to inspect and approve all work area setups before any lead-related construction work is undertaken.
- B. If a work area is breached (failure of polyethylene seals, visible dust emission, airborne lead level above background, etc.), the Contractor shall take immediate action to control the breach and clean the area to the satisfaction of the Owner or the Owner's designated representative.
- C. If sample results indicate that conditions have exceeded the baseline, as determined by the Owner or Owner's designated representative, all work shall cease. Work shall not recommence until the condition(s) causing the increase have been corrected.
- D. Shut down and disconnect all electrical power, gas, sewage, water, phone lines, fire life safety lines and sprinkler systems to the work area so that there is no possibility of reactivation and electrical shock.
- E. Provide all connections for temporary utilities in the work area needed throughout abatement. Temporary electrical power shall be according to OSHA and the National Electrical Code for Wet Environments.
- F. Contractor shall conform to the Owner's lockout requirements, and secure the work area at all times. Area entrances and exits shall be secured by the Contractor throughout the abatement phase. Unauthorized visitors are strictly prohibited. Only the Contractor, Owner or Owner's designative representatives are permitted at the job site. Contractor shall ensure that all doors, gates, windows, and potential entrances to the work areas and the designated waste location areas are secured and locked at the end of each workday.
- G. Contractor shall store all materials, equipment, and supplies for the project inside the building or in areas designated by the Owner. Materials shall be stored in accordance with Owner's requirements.
- H. As required, establish designated limits for the lead-related construction work area with continuous barriers. Use barrier tape (3-inch) with a pre-printed lead warning throughout exterior work areas. Provide signs around the perimeter of all the interior works areas according to EPA and Cal-OSHA.

- I. The Contractor shall be responsible for identifying all HVAC components (if applicable) that lead into or out of the work areas. All components shall be disconnected and sealed airtight for the duration of the work. All openings shall be sealed with two (2) layers of 6-mil polyethylene secured with duct tape, as applicable.
- J. Pre-clean the work area and fixed objects in the work area using HEPA filtered vacuums and/or wet cleaning methods. Protect fixed objects with protective barriers (as appropriate) and cover with 6-mil poly sealed with tape.

3.02 CONTAINMENT SET-UP PROCEDURES

- A. Containment is not required for non-abrasive exterior lead-related construction work. However, all work shall be conducted within a lead regulated area demarcated with barrier tape and appropriate signage. Contractor shall seal operable windows and air intakes within 50 feet of the work area with two layers of 6-mil polyethylene sealed with tape. A 6-mil polyethylene drop sheet is required to extend 10 feet beyond the work area when lead debris, dust or waste is expected to be generated.
- B. Contractor shall construct a full containment negative pressure containment for lead-related abrasive removal work. Install critical barriers consisting of one layer of 6-mil poly on windows and doors. Cover floor and wall surfaces with 6-mil poly sealed with tape. Cover floors first so that plastic extends up the walls at least 12 inches, then cover walls with 6-mil poly to the floor level, thus overlapping the floor material by a minimum of 12 inches. Pony walls shall be constructed with 6-mil poly if the perimeter walls of the containment area do not extend to the deck above. The work area(s) shall be placed under negative pressure as outlined in this specification throughout the work period.
- C. Contractor shall construct critical barrier negative pressure containment for interior lead-related construction work. The work area(s) shall be placed under negative pressure as outlined in this specification throughout the work period.
- D. All interior and exterior lead-related construction work shall be conducted with 6-mil poly drop sheets sufficient in size to prevent dissemination of paint beyond the drop sheet or a minimum of 10 feet in all directions. A lead regulated area shall be constructed with barrier tape and appropriate lead signage in accordance with Title 8 CCR 1532.1 to limit access to the work areas. Uncontained exterior lead-related construction work shall be suspended for the workday if wind speeds exceed 15 miles per hour.
- E. To permit the inspector to view the majority of the work area, the Contractor shall provide easily accessible viewing ports from the clean space into each work area. Viewing ports must be a minimum of 2' x 2', clear-see-through plastic with no scratches, tape or glue marks.
- F. Pressure differential recorders with strip charts are required to monitor the pressure differential in the work area. The recorders must be calibrated prior to arriving on site and shall be recalibrated monthly throughout the project. Recalibration shall be performed by qualified technicians following the

procedures outlined by the manufacturers. Provide documentation of calibration before beginning work and monthly thereafter.

- G. A three-chambered decontamination unit shall be required during the lead-related construction work conducted utilizing abrasive removal methods. The unit shall be located immediately outside the contained area. A pre-fabricated unit is acceptable. Chambers shall be arranged as follows: (1) a clean/change room shall be the first chamber entered from outside the work area, (2) a shower shall be located between the clean/change room and the dirty/change room, and (3) a dirty/change room shall be the last chamber before entering the work area.
1. The clean/change room of the worker decontamination unit shall be of sufficient size to accommodate the work crew and their belongings. It shall include a respirator storage area and be fully equipped with reserve equipment and materials such as clean suits, towels, soap, tape, and respirator filters.
 2. Worker decontamination unit walls shall be a minimum of two layers of 6-mil fire retardant poly and floors shall be constructed with a minimum of three layers of fire retardant poly. All entry and exit doorways shall consist of at least two sheets of overlapping, fire resistant poly. At no time shall the flapped doors be taped open in order to expedite material or personnel load-out.
- H. A two-chamber decontamination unit may be used during the lead-related construction work conducted in critical barrier containments and in work areas where no containment barriers are used. The unit shall be located immediately outside the work area and shall contain a wash down station.
- I. All water from the decontamination units shall be filtered to the technically feasible limit but not more than five (5) microns before disposal. In addition, the Contractor shall comply with all current local, state and federal codes relating to waste water release.
- J. Contractor shall construct an equipment decontamination enclosure system consisting of a washroom, holding area and clean room separated by airlocks.
- K. Separate areas of the building required to remain in operation from areas of the building undergoing lead-related construction work by means of airtight barriers constructed with suitable wood or metal framing. Apply a minimum of 3/8 inch sheathing on the work and public sides of the barrier. Only fire-rated building materials shall be used.
- L. Approved fire extinguishers (Class ABC, multi-purpose, dry chemical type, rated: 4A; 60BC) shall be readily available to workers (maximum travel distance of 50 feet) inside and adjacent to work area(s). Personnel and emergency exits shall be clearly indicated on the inside of the containment area. The emergency exit plan shall be approved by the Environmental Consultant prior to the set up of any work areas.

3.03 PERSONNEL PROTECTION

A. Informed Workers:

1. All workers shall be informed of the hazards of lead and any other hazardous materials exposure. Workers shall also be instructed in the use and fitting of respirators, protective clothing, decontamination procedures, and all other aspects associated with the work.

B. Personal Hygiene Practices:

1. The Contractor shall enforce and follow good personal hygiene practices during the lead-related construction work. These practices will include but not be limited to the following: no eating, drinking, smoking or applying cosmetics in the work area. The Contractor shall provide a clean space, separated from the work area, for these activities.
2. Workers shall remove street clothes in the clean room and put on a respirator and clean protective clothing before entering the work area. Upon exiting the work area, remove gross contamination from clothing before leaving the work area; proceed to the change room and remove clothing except respirators; proceed to the shower; clean the outside of the respirator with soap and water while showering; remove respirator and thoroughly wash. Following showering, proceed directly to the clean room and dress in street clothes. Do not wear disposable clothing outside the decontamination enclosure system.
3. If data gathered by the Owner or Owner's designated representative in areas adjacent to the work areas shows exposure to airborne lead or lead dust exceeding background levels, that area will become regulated and workers must wear protective clothing and approved respirators and must have a shower facility provided to them.

C. Respirators:

1. Establish a respiratory protection program as outlined by ANSI and required by Cal-OSHA. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH). Respirators selected must be approved by the Competent Person. Submit program for review a minimum of five (5) working days prior to the commencement of abatement activities.
2. Provide workers with approved and personally issued respirators with replaceable filters. Provide sufficient quantity of filters approved by NIOSH for use in lead environments so that workers can change filters as required by the manufacturer.
3. At a minimum, provide each employee with the following respiratory protection for each work phase:
 - a. Pre-cleaning, containment set-up, and containment removal work: NIOSH-approved, half-face respirators with HEPA cartridges.
 - b. Interior and exterior lead-related construction work: NIOSH-approved, half-face respirators with HEPA cartridges and organic vapor cartridges (as necessary).

4. At all times, respiratory protection selected shall, at a minimum, meet the requirements of the Table 1 below.

Table 1 – Respiratory Protection

<u>Airborne Concentration of Lead</u>	<u>Required Respirator</u>
Not in excess of 500 µg/m ³	Half-mask air purifying respirator equipped with high efficiency filters
Not in excess of 1,250 µg/m ³	Loose fitting hood or helmet powered air purifying respirator equipped with high efficiency filters Hood or helmet supplied air respirator operated in a continuous-flow mode
Not in excess of 2,500 µg/m ³	Full face piece air purifying respirator equipped with high efficiency filters Tight fitting powered air purifying respirator equipped with high efficiency filters Full face piece supplied air respirator operated in demand mode Half-mask or full face piece SCBA operated in demand mode
Not in excess of 50,000 µg/m ³	Half-mask supplied air respirator operated in pressure demand or other positive-pressure mode
Not in excess of 100,000 µg/m ³	Full face piece supplied air respirator operated in pressure demand or other positive-pressure mode
Greater than 100,000 µg/m ³ or unknown concentration	Full face piece SCBA operated in pressure demand or other positive-pressure mode

5. Use the respirators presented in Title 8 CCR 1532.1 that afford adequate protection at such upper concentrations of airborne lead. When Type C Respirators are required provide the following:
- The air supply system shall provide Grade D breathing air that conforms to OSHA and ANSI Commodity Specification for Air.
 - Compressed Air System for Type C Respirators shall be high pressure, with a compressor capable of satisfying the respirator manufacturer's recommendations. The compressed air system shall have compressor failure alarm, high temperature alarm, and a carbon monoxide alarm. It also shall have suitable in-line air

- purifying absorbent beds and filters to assure Grade D breathing air.
- c. Use of Belt: Type C respirators shall be worn with belt to minimize possibility of dislodging facemask when hose is snagged in the work area.
- D. Protective Clothing:
1. Provide personnel exposed to lead dust with fire retardant disposable protective whole body clothing, head coverings, gloves, and foot coverings. Provide appropriate gloves to protect workers hands from exposure to hazardous materials. Make sleeves secure at the wrists and make foot coverings secure at the ankles with tape. Ensure that all personnel entering and leaving the work area follow this procedure. Suits shall be of adequate size to accommodate the largest employee. Foot covers may be part of the coveralls. Non-disposable footwear shall be left in the work area until it is decontaminated or disposed of at the completion of the job.
 2. Protective clothing will be worn inside the work area after the area passes pre-work inspection and shall remain in use until the area passes final clearance inspection.
- E. Eye Protection: Provide safety glasses or goggles to personnel removing or handling lead-containing materials and waste.
- F. Shower Requirements: When a shower is required, Contractor shall assure that all certified employees and visitors use protective equipment and the shower or wash down facility following each entry into the containment area after the start of the lead-related construction work.
- G. Emergency Precautions and Procedures:
1. Establish emergency and fire exits from the work area. Display necessary signage at exits and paths to exits with representative visual aids. A diagram of all emergency and fire exits shall be posted in a conspicuous area proximate to the entrance to each work area.
 2. The Contractor's supervisor/competent person shall be trained and certified in first aid and CPR, and be prepared to administer first aid to injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated without delay for decontamination. When an injury occurs, the Contractor shall implement fiber reduction techniques until the injured person has been removed from the work area.
 3. In the event of a loss of negative pressure to the work area, work shall stop immediately and entrances to the work area sealed tight. The Contractor shall also institute dust reduction controls until negative pressure is re-established to acceptable levels.

3.04 LEAD REMOVAL

- A. All painted surfaces are assumed to contain detectable concentrations of lead. Where required (coordinate with project plans and specification), paint removal shall be accomplished with chemical stripper or abrasive methods.
- B. Until an exposure assessment has been performed, Contractor shall treat all employees as if they were exposed to lead above the Permissible Exposure Level (PEL) and shall provide the following:
 - 4. Appropriate respiratory protection to each employee.
 - 5. Appropriate personal protective clothing and equipment.
 - 6. Change areas and hand-washing facilities.
 - 7. Biological monitoring for each employee consisting of sampling and analysis for lead and zinc protoporphyrin levels.
- C. The Contractor shall continuously apply water during lead-related construction work. The water shall be applied with a low-pressure fine spray to minimize airborne dust levels. All lead debris shall be immediately bagged following removal.
- D. Collect personal samples representative of a full shift including at least one sample for each job classification in each work area. Samples must be representative of the monitored employee's regular, daily exposure to lead.
- E. Employees must have proper training which includes the content of the lead standard; the specific nature of the operations which could result in exposure to lead above the action level; the purpose, proper selection, fitting, use and limitations of respirators; the purpose of the medical surveillance program; purpose of engineering controls; content of compliance plans; and the employee's right of access to records.
- F. The Contractor is responsible for proper statistical waste stream categorization, manifesting and disposal of lead-containing waste as required by USEPA and applicable state and local regulations. The Owner, at its option may collect duplicate waste stream samples to verify the statistical methods used by the Contractor. In the event of conflict, the Owner's results will prevail. The Contractor at no additional expense to the Owner will appropriately dispose of the waste.
- G. Contractor shall collect all waste stream samples in the presence of the Environmental Consultant and shall supply the Environmental Consultant with a copy of the chain-of-custody within one (1) day of receipt by the laboratory.
- H. Lead-containing debris and contaminated water shall be cleaned from the work area at the end of each work shift. Contractor shall clean the work area using wet methods and HEPA vacuuming equipment.

3.05 LEAD STABILIZATION

- A. All painted surfaces are assumed to contain detectable concentrations of lead. Where required (coordinate with project plans and specification), paint stabilization

shall be accomplished with mechanical scraping so satisfy the requirements of painting by others. Coordinate with all contract documents.

- B. Until an exposure assessment has been performed, Contractor shall treat all employees as if they were exposed to lead above the Permissible Exposure Level (PEL) and shall provide the following:
 - 1. Appropriate respiratory protection to each employee.
 - 2. Appropriate personal protective clothing and equipment.
 - 3. Change areas and hand-washing facilities.
 - 4. Biological monitoring for each employee consisting of sampling and analysis for lead and zinc protoporphyrin levels
- C. Collect personal samples representative of a full shift including at least one sample for each job classification in each work area. Samples must be representative of the monitored employee's regular, daily exposure to lead.
- D. Employees must have proper training which includes the content of the lead standard; the specific nature of the operations which could result in exposure to lead above the action level; the purpose, proper selection, fitting, use and limitations of respirators; the purpose of the medical surveillance program; purpose of engineering controls; content of compliance plans; and the employee's right of access to records.
- E. The Contractor is responsible for proper statistical waste stream categorization, manifesting and disposal of lead-containing waste as required by USEPA and applicable state and local regulations. The Owner, at its option may collect duplicate waste stream samples to verify the statistical methods used by the Contractor. In the event of conflict, the Owner's results will prevail. The Contractor at no additional expense to the Owner will appropriately dispose of the waste.
- F. Contractor shall collect all waste stream samples in the presence of the Environmental Consultant and shall supply the Environmental Consultant with a copy of the chain-of-custody within one (1) day of receipt by the laboratory.
- G. Lead-containing debris and contaminated water shall be cleaned from the work area at the end of each work shift. Contractor shall clean the work area using wet methods and HEPA vacuuming equipment.

3.06 LEAD DISTURBANCE

- H. All painted surfaces are assumed to contain detectable concentrations of lead. Where required (coordinate with project plans and specification), drilling, sanding, installation of screws, anchors or other activities is required and considered lead disturbing work.
- I. Until an exposure assessment has been performed, Contractor shall treat all employees as if they were exposed to lead above the Permissible Exposure Level (PEL) and shall provide the following:
 - 1. Appropriate respiratory protection to each employee.

2. Appropriate personal protective clothing and equipment.
 3. Change areas and hand-washing facilities.
 4. Biological monitoring for each employee consisting of sampling and analysis for lead and zinc protoporphyrin levels
- J. Collect personal samples representative of a full shift including at least one sample for each job classification in each work area. Samples must be representative of the monitored employee's regular, daily exposure to lead.
- K. Employees must have proper training which includes the content of the lead standard; the specific nature of the operations which could result in exposure to lead above the action level; the purpose, proper selection, fitting, use and limitations of respirators; the purpose of the medical surveillance program; purpose of engineering controls; content of compliance plans; and the employee's right of access to records.
- L. The Contractor is responsible for proper statistical waste stream categorization, manifesting and disposal of lead-containing waste as required by USEPA and applicable state and local regulations. The Owner, at its option may collect duplicate waste stream samples to verify the statistical methods used by the Contractor. In the event of conflict, the Owner's results will prevail. The Contractor at no additional expense to the Owner will appropriately dispose of the waste.
- M. Contractor shall collect all waste stream samples in the presence of the Environmental Consultant and shall supply the Environmental Consultant with a copy of the chain-of-custody within one (1) day of receipt by the laboratory.
- N. Lead-containing debris and contaminated water shall be cleaned from the work area at the end of each work shift. Contractor shall clean the work area using wet methods and HEPA vacuuming equipment.

3.07 LEAD COATINGS ENCAPSULATION

- A. All painted surfaces are assumed to contain detectable concentrations of lead. Where existing paint is expected to remain and exposed as part of a finished system (coordinate with project plans and specifications) encapsulation is required.
- B. Surface preparation and adhesion testing is considered lead-related work and shall comply with this section.
- C. Encapsulants can be applied only after meeting manufacturers requirements for surface preparation and adhesion testing from each type of surface. Results of all adhesion testing shall be documented with location and substrate information and submitted to the owner prior to proceeding with encapsulation in each area.
- D. All encapsulants should be applied by a journeyman painter with similar previous project experience who is also CDPH trained and certified.

- E. Until an exposure assessment has been performed, Contractor shall treat all employees as if they were exposed to lead above the Permissible Exposure Level (PEL) and shall provide the following:
 - 1. Appropriate respiratory protection to each employee.
 - 2. Appropriate personal protective clothing and equipment.
 - 3. Change areas and hand-washing facilities.
 - 4. Biological monitoring for each employee consisting of sampling and analysis for lead and zinc protoporphyrin levels.
- F. Collect personal samples representative of a full shift including at least one sample for each job classification in each work area. Samples must be representative of the monitored employee's regular, daily exposure to lead.
- G. Employees must have proper training which includes the content of the lead standard; the specific nature of the operations which could result in exposure to lead above the action level; the purpose, proper selection, fitting, use and limitations of respirators; the purpose of the medical surveillance program; purpose of engineering controls; content of compliance plans; and the employee's right of access to records.
- H. The Contractor is responsible for proper statistical waste stream categorization, manifesting and disposal of lead-containing waste as required by USEPA and applicable state and local regulations. The Owner, at its option may collect duplicate waste stream samples to verify the statistical methods used by the Contractor. In the event of conflict, the Owner's results will prevail. The Contractor at no additional expense to the Owner will appropriately dispose of the waste.
- I. Contractor shall collect all waste stream samples in the presence of the Environmental Consultant and shall supply the Environmental Consultant with a copy of the chain-of-custody within one (1) day of receipt by the laboratory.
- J. Lead-containing debris and contaminated water shall be cleaned from the work area at the end of each work shift. Contractor shall clean the work area using wet methods and HEPA vacuuming equipment.

3.08 REGULATED AREA MONITORING

- A. Prior to each work shift and continuously throughout the project, each containment and decontamination enclosure system shall be inspected and repaired as needed.
- B. Ambient airborne lead levels outside the work area shall not exceed $1.5 \mu\text{g}/\text{m}^3$. If the airborne lead concentration outside the work area exceeds $1.5 \mu\text{g}/\text{m}^3$, then the work must stop. Contractor must stop and operations reviewed and modified to reduce the airborne lead concentration to within the acceptable limits.

3.09 AIR MONITORING

- A. The purpose of any air monitoring that may be conducted by the Owner or Owner's designated representative will be to detect possible release of dusts emanating from the work areas.
- B. All lead air sampling shall comply with NIOSH 7082 method and NIOSH 7300 method.
- C. The Owner or Owner's designated representative reserves the right to perform and / or observe final clearance inspection and sampling.
- D. The Contractor shall be responsible for all personal air sampling. Daily sampling shall be conducted on 25% of the workers. Sample results shall be available on-site within 24-hours of sample collection. During the performance of any work in the contaminated work area, sufficient personnel breathing zone samples shall be taken to constitute representative sampling. These samples shall be taken each shift and for each distinct crew operation, and shall be used to verify adequacy of dust control and respiratory protection. Personal breathing zone air sampling shall be in accordance with the Cal-OSHA lead in construction standard.

3.10 CLEARANCE INSPECTIONS

- A. The Owner or Owner's designated representative reserves the right to conduct visual inspections. Contractor shall notify the Owner or Owner's designated representative's representative when the decontamination process in each containment area is complete. Evidence of debris will require additional clean up by the Contractor. Contractor shall be responsible for re-cleaning all areas found to be deficient.
- B. If the Owner or Owner's designated representative determines that the work area is sufficiently clean, the Contractor may proceed. If the Owner or Owner's designated representative determines that certain areas require additional cleaning, the Contractor shall re-clean the work area and request a second inspection of the recleaned area. All costs incurred by the Owner or Owner's designated representative for inspections required after the second inspection will be charged to the Contractor.
- C. Once the initial visual is passed, the Contractor shall remove all but the containment critical barriers.
- D. Following the visual inspection, the Contractor may provide a coating of non-diluted encapsulant in the work area.
- E. Lead Clearance Testing: Following encapsulation and drying time, the Owner or Owner's designated representative may conduct clearance sampling. Clearance sampling shall not take place until all encapsulant is dry.

3.11 LEAD CLEARANCE CRITERIA:

- A. Following lead-related construction work the Owner or Owner's designated representative may conduct dust wipe sampling. The dust wipe clearance criteria

are 40 µg/ft² for floors, 250 µg/ft² for window sills and 800 µg/ft² for window troughs, rough floors and exterior surfaces.

- B. If the dust wipe samples do not pass the required clearance criteria, the area shall be re-cleaned and new samples shall be collected by the Owner or Owner's designated representative. The Contractor shall be responsible for all costs associated with re-sampling and re-analyses. This amount will be deducted by the Owner from the Contractor's final payment.
- C. The Owner or Owner's designated representative shall notify the Contractor in writing of acceptable of clearance sampling. The Contractor shall then remove all the remaining barriers in the work area.

3.12 LEAD DISPOSAL

- A. It is the responsibility of the Contractor to determine current waste handling, labeling, transportation and disposal regulations for the work site and for each waste disposal landfill. The Contractor must comply fully with these Specifications, local, state, and federal regulations and provide documentation of the same. Ensure that polyethylene bags are sealed airtight. All bags shall be wet cleaned prior to removing them from the work area.
- B. Ensure all disposal containers are properly labeled according to 8 CCR 1529, 5194 (HAZCOM), 49 CFR 171-179 (USDOT), 40 CFR 61 Subpart M (NESHAP), and any local regulations and state regulations as required by this specification.
- C. Perform appropriate Total Threshold Limit Concentration (TTLC), Soluble Threshold Limit Concentration (STLC) and Toxicity Characteristic Leaching Procedure (TCLP) testing for paint waste disposal as required by this specification, by the regulations, and the selected landfill(s). All testing shall be done in the presence of the Owner's Environmental Consultant. Chain-of-custody forms shall be provided to the Owner and the Environmental Consultant within one (1) day following sample delivery to the laboratory.
- D. Filter all wastewater to the technically feasible limit, but not more than five (5) microns before disposal. Comply with all current local, state and federal codes relating to waste water release. Any discharge shall be pre-approved by Owner.
- E. Lead waste that is properly labeled and double-bagged, may be temporarily stored in areas approved by the Owner. Areas must be made secure before storing the waste. Waste is not to remain in temporary storage area for longer than four (4) days before final load-out of materials.
- F. All lead waste shall be double-wrapped prior to transport from the site.
- G. All vehicles used to transport hazardous waste must be registered with the Department of Toxic Substances Control and display the proper registration and expiration stickers.
- H. All vehicles and containers used to transport waste are subject to inspection and approval of Owner prior to departure from site.
- I. Trucks must have an enclosed cargo area with a storage compartment that is fully lined with a minimum of one (1) layer of 6-mil polyethylene on the walls and

two (2) layers on the floor. The driver of the vehicle must stop the vehicle in a safe location at least once during each two hours or one hundred miles of travel whichever is less and inspect the contents of the shipment. At the time of inspection if any form of binding is found to be loose the driver shall immediately take action to remedy the situation for safe transportation.

- J. Contractor shall not throw bags into the truck in a way that may cause the bags to burst open.
- K. Contractor shall provide at minimum one (1) day advance notification to the Owner when signatures are required on manifest(s). The Contractor shall ensure that the Hazardous Waste Manifest is correctly filled out. The Contractor shall give the appropriate copies to the Owner and shall also instruct the Owner in writing that they must send the appropriate copy to the Department of Toxic Substances Control.
- L. If a debris box is used, the Contractor shall make all necessary arrangement with the Owner including obtaining all appropriate permits.
- M. Contractor is responsible for all coordination with the waste disposal site and with the waste hauling company.
- N. Debris box for hazardous waste shall be fully lined with a double layer of polyethylene sheeting and must be locked at all times when unattended.
- O. Debris box shall be constructed with minimum 20-gauge steel with no windows or openings other than the door. The door of the container shall have a secure cover on the locking device with access to the lock only at the keyhole. Once the debris box is filled and the manifest is signed, Contractor must transport the debris box off the job site.
- P. Disposal shall be in a landfill that meets EPA requirements. Do not throw bags into landfills in a way that may cause the bags to burst open.

END OF SECTION

ATTACHMENT A
LEAD WORK PLAN OUTLINE

In accordance with the contract documents, Cal-OSHA Lead in Construction Standard (Title 8 CCR 1532.1) and CDPH (17 CCR Division 1, Chapter 8), the Contractor is required to prepare a written, site-specific Lead Compliance Plan, and submit to the Owner for approval prior to start of work. This plan is required for the contractor to meet Cal-OSHA and CDPH requirements as well as the contract documents, and shall describe work procedures and control methods that will protect the Owner's facilities and the environment.

I. Location of Work:

The work to be completed under this work plan will be completed at:

(Building name)

(Location within building)

Previous lead inspections or surveys have found that lead-based paints/coatings, or other lead-containing materials are present at the following locations:

(List all materials and locations to assure the Owner and the Contractor are aware of all lead-containing materials locations)

II. Description of Work:

Describe the anticipated work scope, including:

- A. Paint removal (list paints or coatings, and locations)
- B. Paint stabilization or encapsulation (list paints or coatings, and locations)
- C. Removal and/or replacement of lead-coated components (list components and locations)
- D. Dust/residue removal or decontamination (list materials and locations)
- E. Demolition of lead-coated components
- F. Any other activities that will or may result in worker exposures to lead

III. Schedule:

Phase/Task	Anticipated Date(s)
Mobilization	_____
Set-up of work area(s), containments	_____
Lead-related construction	_____
Final Cleaning	_____
Visual Inspection	_____
Final Clearance (visual and sampling)	_____
Teardown	_____
Demobilization	_____

The competent person, _____, will conduct worksite visual inspections on a daily basis, or more often as necessary.

IV. Equipment and Materials

List all equipment and materials to be used, such as the following:

HEPA Vacuums

Negative air filtration units

Scrapers	Manometers
Power saws	Shower facilities
Pry bars	Airless sprayers/compressors
Cutting shears	Cleaning detergents
Other hand tools	Solvents (must be approved by Owner)
Encapsulants/sealants	Roller/brushes
Gloves	Disposable coveralls
Respiratory protection	Eye & foot protection

V. Crew

List all workers and supervisors with emergency contact names and pagers.

Clearly identify the supervisor and competent person who have authority for all safety and health.

VI. Control Measures and Work Practices

Describe in a narrative format specific work procedures, exposure/contamination controls, and engineering controls. This description should include, but not be limited to, the following:

Location, size, layout & detail of work	Wet methods
Negative pressure enclosure	Local exhaust ventilation for tools
Respiratory protection	HEPA vacuums
Vacuum assisted blasting	General room ventilation
Containment (i.e., poly barriers)	Interface of trades involved
Methods to assure safety of bldg occupants	Pollution control
Removal method to reduce lead dust generation	

VII. Technology To Be Used In Meeting the PEL

List all or any specialized equipment to be used to meet the PEL.

VIII. Respiratory Protection and Protective Clothing/Personal Protective Equipment

List all respiratory protection including types and manufacturers, which are anticipated for this project. Identify the phases of the project for which respirators will be required or likely to be required. List all personal protective equipment anticipated to be used on the project.

IX. Decontamination/Hygiene Facilities

Identify the types and locations of decontamination or hygiene facilities to be used on this project. Specify use of disposable towels, soap, hot and cold water, and other supplies. Specify the required use of the facilities, including use of the facilities prior to eating, drinking, smoking and before leaving the project site. Describe handling or treatment of lead-contaminated solid waste and wastewater.

X. Air Monitoring Data

Identify general worker air monitoring protocols (must include 25% of personnel daily) to be followed on this project, including worker category classifications, frequency of monitoring, anticipated laboratory to be used for analysis, pump calibration techniques, etc. Identify the competent person responsible for conducting personal air monitoring.

XI. Medical Surveillance Program

Describe the Contractor's medical surveillance program currently in place. Identify the physician or medical provider firm currently handling the medical surveillance needs and include name and phone number.

XII. Worker Training

Provide the Contractor's Lead Worker Training Certificates per the specifications.

XIII. Waste

Describe how all waste on this project will be packaged, waste characterized, labeled, stored, transported, manifested and disposed.

XIV. Notification

Describe all arrangements made on multi-employer work sites to inform affected employers about the lead project. Attach copies of any notifications.

XV. Preparation of Lead Work Plan

Date Prepared and Prepared By (signature, name and title)

BULK SAMPLE CHAIN-OF-CUSTODY

Report to:	Stephen Jackson (OAK)	Email:	sjackson@accenv.com	Phone:	Stephen: (510) 512-8320
Project Name:	Limited Asbestos, PCB and Lead Survey - OUSD Fremont HS, Library				
Project Address:	Fremont High School: 4160 Foothill Blvd	Project Number:	3029-295.00		
Collected by:	Mercede Ramjerdi: CSST #18-6266; LRC (I/A)-00005009	Date Collected:	12/29/2020		
Analysis:	Lead: Metals Analysis (Bulk/ Paint Chip)	Stop at 1st Positive?	Turnaround Time:	Standard (3-5 Day)	
Comments:					

Sample ID	Material Size-Color-Pattern-Material-Post Description	Material Location [Quantity] Building or Floor: Area(s) - Component	Sample Location Area - Component	Size
PT-1	Beige Paint Over Wood Window Frames, Sills	All Floors: Exterior -Partial Window Frames, Sills (L&P = 40 SF)	1. 2F, Exterior - S Wall	2" X 2"
PT-2	Orange/Beige Paint Over Metal Window Frames	All Floors: Exterior -Partial Windows (L&P= 15 SF)	1. 2F, Exterior - S Wall	Chip
PT-3	White/Cream Paint Over Exterior Stucco Walls	All Floors Exterior -Walls (L&P = 15 SF)	1. 2F, Exterior - S Wall	2" X 2"
PT-4	White Paint Over Exterior Metal Trim	2nd Floor: Exterior -Window Covers, Structural Steel (Intact)	1. 2F, Exterior - S Wall	Chip
PT-5	White Paint Over Interior Metal Window Frames	2nd Floor: All Areas -Window Frames (L&P = 10 SF)	1. Library - W Window Frame	2" X 2"
PT-6	White Paint Over Interior Plaster Walls	All Floors: All Areas -Partial Walls (Intact)	1. 2F, Library - W Wall	2" X 2"
PT-7	Red Paint Over Interior Wood Window Frames	1st Floor: All Areas -Window Frames, Window Sills (Intact)	1. Office 2112 - W Window Sill	2" X 2"
PT-8	White Paint Over Interior Wallboard Walls	1st Floor: All Areas -Partial Walls (Intact)	1. Office 2116 - N Wall	2" X 2"
PT-9	Beige Paint Over Exterior Stucco Walls	All Floors: Exterior -Partial Walls (L&P = 4 SF)	1. Ground Level, Exterior - S Wall	2" X 2"

Released:	Mercede Ramjerdi	Signature:		Date:	12/29/2020	Time:	Fedex
Received:		Signature:		Date:	DEC 30 2020	Time:	
Lab Info:	SGS Forensic Laboratories: 3777 Depot Road #409, Hayward, California 94545 - (510) 887-8828						



Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101762)

ACC Environmental Consultants
Stephen Jackson
7977 Capwell Dr., Suite 100

Oakland, CA 94621

Client ID: 1117
Report Number: M230723
Date Received: 12/30/20
Date Analyzed: 01/04/21
Date Printed: 01/04/21
First Reported: 01/04/21

Job ID / Site: 3029-295.00, Limited Asbestos, PCB and Lead Survey, OUSD Fremont HS,
Library, Fremont High School, 4160 Foothill Blvd.

Date(s) Collected: 12/29/20

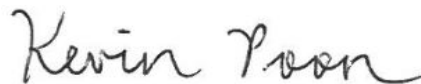
SGSFL Job ID: 1117

Total Samples Submitted: 8

Total Samples Analyzed: 8

Sample Number	Lab Number	Area in ²	Analyte	Result	Result Units	Reporting Limit*	Method Reference
PT-1	30881244	4.00	Pb	7.4	wt%	0.6	EPA 3050B/7000B
PT-2	30881245		Pb	11	wt%	2	EPA 3050B/7000B
PT-3	30881246	4.00	Pb	0.14	wt%	0.006	EPA 3050B/7000B
PT-4	30881247		Pb	0.038	wt%	0.006	EPA 3050B/7000B
PT-5	30881248	4.00	Pb	1.2	wt%	0.2	EPA 3050B/7000B
PT-7	30881249	4.00	Pb	0.039	wt%	0.006	EPA 3050B/7000B
PT-8	30881250	4.00	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PT-9	30881251	4.00	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.



Kevin Poon, Laboratory Analyst, Hayward Laboratory

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Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

SECTION 03 10 00

FORMWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Includes: Provision of formwork for cast-in-place concrete and installation of embedded items. See architectural drawings for locations of exposed concrete.
- B. Related Items:
 - 1. Section 032000 - Concrete Reinforcement.
 - 2. Section 033000 - Cast-In-Place Concrete.

1.2 REFERENCES

- A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specification, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
 - 1. California Code of Regulations, Title 24, Part II, 2019 Edition, also known as California Building Code (CBC).
 - 2. American Society for Testing and Materials (ASTM).
 - 3. American Concrete Institute's "Recommended Practice for Concrete Formwork," (ACI 347).
 - 4. United States Voluntary Product Standard for Construction and Industrial Plywood (PSI-83).
 - 5. American Plywood Association's "Guide to Plywood Grades" (APA).
 - 6. West Coast Lumber Inspection Bureau's "Standard Grading Rules No. 16" (WCLIB).

1.3 QUALITY ASSURANCE

- A. Design Criteria: Formwork shall conform to ACI 347.
 - 1. Formwork:
 - a. Shall prevent leakage or washing out of cement mortar.
 - b. Shall resist spread, shifting, and settling.
 - c. Shall reproduce accurately required lines, grades, and surfaces within tolerances specified.
 - 2. Safety: The Contractor shall be responsible for adequate strength and safety of all formwork including falsework and shoring.
- B. Allowable Tolerances: Formwork shall produce concrete within tolerance limits recommended in ACI 347, unless otherwise noted.

1.4 SUBMITTALS

- A. Samples: Only as requested by the Architect.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

1.6 JOB CONDITIONS

- A. Sequencing Schedule:

1. Ensure timely delivery of embedded items. Be responsible for cutting and patching necessitated by failure to place embedded items.
2. Plan erection and removal to permit proper sequence of concrete placing without damage to concrete.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forming Materials:

1. Panel or board forms at the Contractor's option.

- a. Panel Forms: Minimum 5/8-inch thick exterior grade plywood with sealed edges, PS 1 grade Plyform Class I and II B-B Exterior or HDO Exterior.
- b. Board Forms: Shiplap or tongue and groove lined with PS 1 grade Plyform Class I and II Exterior 1/2-inch or HDO Exterior 1/2-inch or 3/16-inch thick fiberboard conforming to FS LLL-B-810a(1), type I.

2. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.

- a. Use Plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, with each piece bearing legible inspection trademark. Panels to receive specified form sealer to ensure uniform finish of exposed surfaces.
- b. Designated "Architectural Concrete" Surfaces: Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class 1.

3. Forms for Exposed Textured Concrete for Walls: All concrete surfaces designated in the architectural plans or specifications as "textured architectural concrete" shall be formed using Fitzgerald Formliners Pattern No. 17943 0.75 deep Sine wave as manufactured by Fitzgerald Formliners, 1500 E. Chestnut Avenue, Santa Ana, CA 92701

4. Chamfer Strips: Burke Concrete Accessories' PVC type CSF 1/2-inch, all exposed corners.

- B. Wood Framing: WCLIB standard grade or better Douglas Fir.

- C. Form Ties and Spreaders: Metal type acting as spreaders, leaving no metal within one inch of concrete face and no fractures, spalls, depressions or other surface disfigurements greater than 3/4-inch in diameter.

- D. Form Sealer: Same as Grace Construction Material's "Formfilm"; or equal product substituted per Section 012513.
- E. Release Agent: Must not stain or otherwise adversely affect architectural concrete surfaces. Same as The Nox-Crete Co.'s "Nox-Crete Form Coating"; Industrial Synthetics Corp.'s "Synthex;" or equal product substituted per Section 012513.
- F. Foam Board: Extruded close cell polystyrene foam, channeled for drainage, with a minimum compressive strength of 25 psi at 0.1-inch deformation when tested in accordance with ASTM D1621-73, and meeting requirements of FS-HH-I-524b, Type II, Class B. Same as The Dow Chemical Co.'s "Styroform PD Brand" or equal product substituted per Section 012513.

2.2 SOURCE QUALITY CONTROL

- A. Plywood shall bear APA grade-trademark.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where formwork will be constructed and verify that:
 - 1. Excavations are sufficient to permit placement, inspection and removal of forms.
 - 2. Excavations for earth forms have been neatly and accurately cut.
 - 3. Conditions are otherwise proper for formwork construction.
- B. Do not start work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Obtain necessary information for coordination of formwork with items to be embedded in concrete and other related work.

3.3 CONSTRUCTION

- A. General:
 - 1. Design, erect, support, brace and maintain formwork to support vertical and lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position. Maintain formwork construction tolerances complying with ACI 347.
 - 2. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb Work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in Work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.
 - 3. Frame openings where indicated on Architectural, Structural, Mechanical, Plumbing and Electrical drawings.
- B. Earth Forms:
 - 1. Construct wood edge strips at top sides of excavations.

2. Provide forms for footings wherever concrete cannot be placed against solid earth excavation.
3. Remove loose dirt and debris prior to concrete pours.
4. Foundation concrete may be placed directly into neat excavations provided the foundation trench walls are stable as determined by the Architect, subject to the approval of DSA. In such case, minimum formwork shown on the drawings is mandatory to ensure clean excavations immediately prior to and during the placing of concrete.

C. Walls and Other Formed Elements:

1. Erect outside forms for exposed exterior walls first and obtain the Architect's approval before reinforcement is placed. Obtain Architect's approval of the reinforcement before interior form is erected.
2. Carefully align inside and outside forms before tightening ties.
3. Plywood Forms: Insure vertical joints are plumb and horizontal joints are level; arrange joints and ties in geometrical pattern as approved by the Architect.
4. Form inside corners at exposed conditions with mitered boards or plywood so that no concrete is placed against form ends.
5. After erection, seal all cracks, holes, slits, gaps, and apertures in forms so that they will withstand the pressure and will remain completely watertight.
6. Provide a means to seal the bottom of forms at construction joints such as foam tape or other gasket devices.
7. Apply a coating of release agent prior to the erection of formwork. Follow approved manufacturer's recommendations.

D. Slab Forms:

1. Establish levels and set screeds.
2. Depress slabs where required to receive special floor finishes.

E. Cleanouts and Openings: Provide on interior face of wall forms as required for effective removal of loose dirt, debris and waste material, for inspection of reinforcing and for introduction of vibrators where the Architect deems necessary.

F. Construction Joints:

1. Provide where shown on the drawings as directed by the Architect and per CBC Section 1908A.7.
2. Provide key indentations at all joints.
3. Provide pour strips on inside face of forms at horizontal joints, but remove strips and thoroughly clean out reglets before placing subsequent portions of wall.
4. Prevent formations of shoulders and ledges.
5. Provide means for drawing forms into firm contact with concrete before placing additional concrete over previous pours where shrinking and warping has separated concrete from forms.

G. Embedded Items:

1. Properly locate, unless locating is specified elsewhere, and place inserts and embedded items required by other trades prior to casting concrete.

H. Shoring:

1. Adequately brace and maintain shoring to safely support vertical, lateral, and asymmetrical loads until completed structure has attained design strength.
2. Distribute shoring loads over area where shoring is erected and protect against undermining or settlement.
3. Provide means for making vertical adjustments to compensate for settlement either before or during placing of concrete.
4. Construct shores for soffits of beams to permit removal of forms without removing shores.
5. Reshoring will be permitted. Shores and reshores shall be designed by a Civil Engineer registered in the State of California and installed under his/her direction. This Civil Engineer shall be employed by the Contractor.

3.4 REMOVAL

- A. Secure the Architect's approval for time and sequence of form removal.
- B. Form Removal: Forms shall be removed without damage to the concrete, and in no case shall they be removed prior to the concrete member attaining the specified strength.

<u>MEMBER</u>	<u>STRENGTH</u>	<u>MINIMUM TIME*</u>
Vertical surfaces of walls, columns, beams,	0.60 f'c	7 days
Beams, slab	0.75 f'c	14 days

*Estimated curing time required to obtain desired strength. Results of the 7-day test cylinder break shall be presented to the Architect to demonstrate compliance with above specified strength requirements prior to form removal. If a 7-day test cylinder break demonstrates strength that is less than that specified, the Contractor may elect to take additional cylinders at the time of next pour to demonstrate strength requirements. The Contractor shall bear the cost of taking and testing the additional samples.

- C. Forms:
 1. Remove forms carefully to avoid damaging corners and edges of exposed concrete.
 2. Reuse:
 - a. The Architect will approve reuse of forms provided they are straight, clean, free from nails, dirt, hardened concrete, or other injurious matter and edges and surfaces are in good condition.
 - b. Clean and repair any damage caused by placing, removal, or storage. Reuse of formwork with repairs or patches which would result in adverse effects to architectural concrete finish will not be permitted.
 - c. Store formwork in manner to prevent damage or distortion.
 - d. Reseal as required to achieve concrete of specified quality.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section Includes: Provision of reinforcement for all concrete unless specifically noted otherwise.
- B. Related Items:
 - 1. Section 031000 - Formwork
 - 2. Section 033000 - Cast-In-Place Concrete.

1.2 REFERENCES

- A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specification, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
 - 1. California Code of Regulations, Title 24, Part II, 2019 Edition, also known as California Building Code (CBC).
 - 2. American Society for Testing and Materials (ASTM).
 - 3. American Concrete Institute's:
 - a. "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (ACI 345).
 - b. "Building Code Requirements for Reinforced Concrete" (ACI 318).
 - 4. Concrete Reinforcing Steel Institute (CRSI):
 - a. "Manual of Standard Practice."
 - b. "Recommended Practice for Placing Reinforcing Bars."
 - 5. American Welding Society's:
 - a. "Mild Steel Covered Arc-Welding Electrodes" (AWS A5.1).
 - b. "Reinforcing Steel Welding Code" (AWS D1.4).

1.3 QUALITY ASSURANCE

- A. Welders' Qualifications: Welders shall be qualified in accordance with AWS D1.4.
- B. Reinforcing steel shall not be permitted to rust where there is danger of staining exposed surfaces of adjacent concrete. The Contractor shall replace rust-stained concrete at his expense.
- C. ~~Allowable Tolerances: Reinforcing steel shall be placed within tolerances permitted by CBC, Section 1907A.5 unless otherwise approved by the Architect~~

- D. The District's Testing Agency will provide tests in accordance with CBC, Section 1910A.2.
 - 1. Collect mill test reports for reinforcement.
 - 2. Take samples from bundles at fabricators.
 - a. When bundles are identified by heat number and accompanied by mill analysis, two specimens shall be taken from each ten (10) tons, or fraction thereof, of each size and grade.
 - b. When reinforcement is not positively identified by heat numbers or when random sampling is intended, two specimens shall be taken from each 2½ tons, or fraction thereof, of each size and grade.
 - 3. Test for tensile and bending strengths.
 - 4. Provide inspection of welding, including prior fit-up, welding equipment, weld quality and welder certification in accordance with AWS D1.4. Chemical analysis sufficient to determine carbon equivalent and minimum preheat temperature shall be performed when reinforcement does not conform to low-alloy steel requirements of CBC Section, 1903A.8.

1.4 SUBMITTALS

- A. Shop Drawings: Show bending and placing details, size and location of reinforcing steel. Include diagrammatic wall elevations at ¼ - inch equals one foot scale to clearly show position and erection marks of bars including marginal bars around openings with dowels, splices, etc.
- B. Certified mill test reports (tensile and bending) for each heat or melt of steel prior to delivery of material to the job site. Where reinforcing is to be welded, mill test reports shall verify the weldability of the steel.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcement and accessories to the site not more than 48-hours before placement.
- B. Store in manner to prevent excessive rusting and fouling with grease, dirt, or other bond-weakening coatings.
- C. Take precautions to maintain identification after bundles are broken.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Bars: New billet steel, ASTM A615 Grade 60.
- B. Welded Bars: New billet steel ASTM A706 Grade 60.
- C. Tire Wires and Spirals: ASTM A82.
- D. Welded Wire Fabric: ASTM A185.
- E. Welding Electrodes: Mild steel covered arc-welding types conforming to AWS A5.1.
- F. Bar Supports: As required for assembling and supporting reinforcement in place.
 - 1. CRSI Class 3: Where bar supports do not come in contact with exposed concrete surfaces.

2. CRSI Class 1 plastic-protected; or class 2 stainless steel wire: Interior and Exterior Soffits and Other Exposed Conditions.
 3. Precast Concrete Wired Block: At slabs-on-grade and as necessary at other locations.
- G. Threaded coupler: Lenton Standard coupler by ERICO or equal product substituted per Section 012513. Couplers may be Type 1 except where otherwise noted.
1. Type 1 Couplers shall develop 125-percent of specified yield strength reinforcement.
 2. Type 2 Couplers shall develop 160-percent of the tensile strength or 200-percent of the yield strength of reinforcement.
- H. Welded Deformed Bar Anchors: ASTM A-104, $f_y = 70,000$, flux filled deformed bar anchors. Same as Nelson D2L or equal product substituted per Section 012513.

2.2 Fabrication

- A. Shop-fabricate to comply with drawings
- B. Conform to requirements of ACI 318 where specific details are not shown or where drawings and specifications are not more demanding.

PART 3 - EXECUTION

3.1 Placement

A. General:

1. Place bars as noted.
2. All reinforcement shall be continuous. See drawings for lap splice schedule. Stagger splices where possible. Contact lap splices shall be securely wired together to maintain alignment..
3. Ensure placement will permit concrete protection in conformance with CRSI or to extent shown.
4. Support and fasten bars securely with spacers, chairs or ties to permit their being walked upon without displacement or movement both before and during placement of concrete. Wire-tie bar intersections.
5. Do not bend bars around openings or sleeves. Wherever conduits', piping, inserts, sleeves, etc... interfere with placing of reinforcement, obtain the Architect's approval of placing before concreting.
6. Do not field bend bars unless expressly noted in the Contract Documents.

B. Welding:

1. Employ shielded metal-arc method and conform to AWS D1.4.
2. Ensure equipment supplies proper current and voltage and is adjustable to suit arrangement and thickness of items welded.

- C. Prior to placing concrete, verify reinforcement has been bent, positioned, and secured in accordance with drawings; ensure removal of oil, grease, dirt, or other bond-weakening coatings; replace severely rust-pitted reinforcing bars.

D. Quality Assurance:

1. The project Inspector will inspect placement of reinforcement and mechanical splices and notify Structural Engineer of any discrepancies in placement.

2. The Owner's testing Agency will inspect shop and field welding of reinforcing bars in accordance with CBC Section 1705A.3.1

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section Includes: Provision of cast-in-place concrete unless specifically noted otherwise.
- B. Related Items:
 - 1. Section 031000 - Formwork
 - 2. Section 032000 - Concrete Reinforcement.

1.2 REFERENCES

- A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specification, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
 - 1. California Code of Regulations, Title 24, Part II, 2019 Edition, also known as California Building Code (CBC).
 - 2. American Society for Testing and Materials (ASTM).
 - 3. American Concrete Institute's:
 - a. "Standard Specifications for tolerances for Concrete Construction and Materials" (ACI 117).
 - b. "Specification for Structural Concrete for Buildings" (ACI 301).
 - c. "Recommended Practice for Measuring, Mixing and Placing Concrete" (ACI 304).
 - d. "Recommended Practice for Hot Weather Concreting" (ACI 305).
 - e. "Recommended Practice for Cold Weather Concreting" (ACI 306).
 - f. "Building Code Requirements for Reinforced Concrete" (ACI 318).
 - 4. State of California, Business and transportation Agency Division of Highways' "Materials Manual," (CMM).

1.3 QUALITY ASSURANCE

- A. The Contractor's Testing Laboratory Qualifications: The Contractor's Testing Laboratory shall be under direction of a Civil Engineer registered in the State of California, shall have operated successfully for four years prior to this work, and shall conform to requirements of ASTM E329.
- B. Requirements of ACI 301 shall govern work, materials and equipment related to this Section; specifications herein set minimum results required, and references to procedures are intended to establish minimal guides.
- C. The Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete meets minimum requirements. Tolerances shall meet the requirements of ACI 117 except as modified in the Construction Documents.

- D. Placing of concrete by means of pumping will be an acceptable method of placement providing that the Contractor can demonstrate that:
 1. Specified concrete strengths will be met.
 2. Equipment has a record of satisfactory performance under similar conditions and using a similar mix.
 3. Trial batches have been made.

1.4 SUBMITTALS

- A. The Contractor's Testing Laboratory's certificate of compliance per ASTM E329.
- B. The Contractor shall submit:
 1. Certified copies of mix designs for each concrete class specified including compressive strength test reports.
 2. Certification that materials meet the requirements specified.
 3. Samples only as requested by the Architect. 6x6 sample of selected colors.
 4. Certification from vendor that samples originate from and are representative of each lot proposed for use.
- C. The District's Testing Agency will submit reports on tests and inspections performed to the District, the Architect, the Contractor, and the DSA.
- D. Shop Drawings: Show construction and expansion and contraction joint locations and details.
- E. Schedule of placing for the Architect's review before starting work.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Ensure storage facilities are weather tight and dry.
- B. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.
- C. Store bulk cement in bins capable of preventing exposure to moisture.
- D. Use sacked cement in chronological order of delivery. Store each shipment so that it may be readily distinguishable from other shipments.

PART 2 - PRODUCTS

2.1 CONCRETE

- A. Table 2-1: Concrete Properties

Class/Use	28 -Day Strength	Aggregate Size	Weight	Max Slump	Water / Cement	% Flyash	Comments
A. Walls, Pilaster	4000	1	145	4	0.50	25	

- B. Strength refers to the compressive strength in psi after 28-days when tested in accordance with ASTM C39. All concrete shall develop compression strength specified in 28-days. To meet above requirements, mix shall be designed such that average compressive strength will exceed specified 28-day strength by an amount as specified by ACI 318.
- C. Aggregate size refers to the maximum size in inches.
- D. Weight refers to pounds per cubic foot, air dry.
- E. Slump is measured in inches and tested in accordance with ASTM C143.
- F. Water/Cement Ratio is the maximum ratio of water to cementitious material by weight.

2.1 MATERIALS

A. General Requirements:

1. Cement and aggregates shall have proven history of successful use with one another. Sources of cement and aggregate shall remain unchanged through-out work unless the Architect approves request for change made at least 10-days prior to anticipated date of casting.
2. Ready-mixed concrete shall meet requirements of ASTM C94.
3. Deviations in properties of materials tested by the District's Testing Agency shall be cause for their rejection pending additional test results and redesign of mix by the Contractor's Testing Laboratory.
4. No frozen aggregates will be permitted.

B. Cements: ASTM C150, Type II. Use one brand of cement throughout project unless otherwise directed by the Architect.

C. Fly Ash: ASTM C618, Type F.

D. Aggregates:

1. Coarse: ASTM C33. Coarse aggregate shall consist of a clean, hard, fine grained, sound crushed rock, or washed gravel or a combination of both. It shall be free from oil, organic matter or other deleterious substances and shall not contain more than two percent by weight of shale or cherty material. "Cleanness value shall not be less than 75 when tested per MM Test Method, 227 and conforming to CBC Section 1908A.3.
2. Fines: ASTM C33. Sand equivalent shall be not less than 75 when tested as per ASTM D2419.
3. Light Weight Aggregates: ASTM C330; expanded shale type uniformly graded from 3/4-inch to No. 200 Mesh. Cleanliness value and sand equivalent not less than 75.
4. Provide aggregates from a single source for exposed concrete.
5. Aggregates to be used at exposed concrete surfaces shall be well graded.

E. Water: Clean and potable, free from impurities detrimental to concrete.

F. Admixtures:

1. Water-Reducing Admixture: ASTM C494, Type A, non-lignini sulfonate. Same as Grace Construction Materials' "WRDA with Hycol"; Master Builders "Pozzolith 322N"; Sika Corp.'s "Plastocrete 161"; or equal product substituted per Section 012513.

2. Air Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other products. Same as W.R. Grace's "Daravair," Master Builders' "Micro-Air," Sika Corp.'s "Sika Aer," or equal product substituted per Section 012513. Air entraining admixture shall not be used at polished concrete.
 3. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C494, Type F or Type G. Same as W.R. Grace's "Daracem 19," Master Builders' "Rheobuild," Sika Corp.'s "Sikament," or equal product substituted per Section 012513.
 4. Water Reducing, Accelerator Admixture: ASTM C494, Type E. Same as W.R. Grace's "Polarset," Master Builder's "Pozzutec 20," Sika's "Sikaset NC," or equal product substituted per Section 012513.
 5. Water Reducing, Retarding Admixture: ASTM C494, Type D. Same as W.R. Grace's "Daratard-17," Master Builders' "Pozzoliith R," Sika's "Plastiment," or equal product substituted per Section 012513.
 6. Other Admixtures: Only as approved by the Architect.
- G. Non-Shrink Grout: Premixed high strength grout requiring only addition of water at the site. Same as Hilit "CG 200 PC"; Burke's "Non-Ferrous, Non-Shrink Grout," or equal product substituted per Section 012513.
- H. Curing Materials:
1. Waterproof Paper: ASTM C171, Type 1, regular. Same as Sisalkraft Division of St. Regis Paper Co.'s "Orange Label"; or equal product substituted per Section 012513.
 2. Sheet Plastic: Polyethylene, four mils thick, fungus-resistant.
 3. Curing Compound: ASTM C309. Same as Curecrete Chemical Company's "Ashford Formula," Master Builders' "Masterkure N-Seal-W," or equal product substituted per Section 012513.
- I. Epoxy Adhesive: Two component material suitable for anchoring rebar into dry or damp concrete. Hilti's, Hilti's "RE 500 SD per ICC-ES ESR 2322," Simpson Strong-Tie's "SET XP per ICC-ES ESR 2508" or equal product substituted per Section 012513.
- J. Sleeves through concrete: ASTM A53 galvanized per ASTM A153.
- K. Sealing Compound: Ashford Formula manufactured by Curecrete Distribution Inc. www.ashfordformula.com.
- L. Concrete Floor Slab, saw Cut, Joint, Crack Repair Material: Cement based, polymere-modified product that can be feathered at edges to match adjacent floor elevations. Compressive strength not less than 4,200 psi at 28 days when tested according to ASTM C109. Equivalent to ARDEX SD-F Feather Finish, www.ardex.com
- M. Curing, Hardening and Vapor Barrier Compound: ASTM C1315, Type I, Class A and ASTM C309, Type 1, Class A, with maximum volatile organic compound (VOC) content rating as required to suit regulatory requirements. Material to have no less than 34 percent penetrating solids, have no visible sheen and be compatible with floor finish materials and overlays.
- N. Rust Resistant Paint for Reinforcing Steel: Rust-Oleum or approved equal
- O. Concrete Adhesive: Quikrete concrete bonding adhesive No. 9902
- P. Concrete Protection: Scofield Proguard Duracover at polished concrete slabs.

- Q. Waterstops: self expanding Butyl Strip Waterstops: manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, ¾ bu 1” (products: concrete Sealants, Inc; Conseal CS-231; Colloid Environmental Technologies Company: Volclay Waterstop-RX; TCMiraDRI: Mirastop.
- R. Integally Colored Concrete: Powder Pigments (Davis) or Chromix Admixture LM Scofield or equal. Colors to be selected by architects from manufacturer’s full range.

2.3 MIXES

A. General Requirements:

1. The Contractor shall perform tests or assemble the necessary data indicating conformance with specifications.
2. For each mix submit data showing that proposed mix will attain the required strength in accordance with requirements of ACI 301.
3. If sufficient test results for Method “B” are not available, the contractor shall produce trial mixes in accordance with requirements of ACI 301.
4. The Contractor shall instruct Laboratory to base mix design on use of materials tested and approved by the District’s Testing Agency.
5. Mix design shall include compression strength test reports per ACI 301.
6. Mix shall be designed, tested, and adjusted if necessary in ample time before first concrete is scheduled to be placed. Laboratory data and strength test results for revised mix design shall be submitted to Architect prior to using in project.
7. Ensure mix designs will produce concrete to strengths specified and of uniform density without segregation.
8. If mix yield exceeds 1-cubic yard, modify mix design to no more than one cubic yard without changing cement content.
9. The Contractor’s mix designs shall be subject to review by the Architect and by the District’s Testing Agency.
10. Introduction of calcium chloride will not be permitted.
11. Unspecified admixtures will not be permitted unless the Architect reviews, the Contractor modifies mix designs as necessary, and modifications are accepted by the District’s Testing Agency.

B. Slab-on-Grade Mix requirements: Use of Water-Reducing admixture is required. High Range Water-Reducing admixture (super plasticizer) shall be used when required to maintain workability and pumpability.

C. Patching Mortar: Mix in proportions by volume of one part cement to two parts fine sand.

D. Non-Shrink Grout: Follow approved manufacturer’s printed instructions and recommendations.

2.4 MIXING

A. Batching Plant Conditions:

1. Batch plant shall be certified to comply with the requirements of the National Concrete Ready Mix Association.
2. Ensure equipment and plant will afford accurate weighing, minimize segregation and will efficiently handle all materials to satisfaction of the Architect and the District’s Testing Agency.
3. Replace at no additional expense equipment the Architect and the District’s Testing Agency deem inadequate or unsuitable.

4. Use approved moisture meter capable of determining moisture content of sand.

B. General Requirements:

1. Thoroughly clean concrete equipment before use for architectural concrete mixes to avoid contamination.
2. Mix cement, fine and coarse aggregates, admixtures and water to exact proportions of mix designs. Method of mixing shall comply with ACI 301.
3. Measure fine and coarse aggregates separately according to approved method that provides accurate control and easy checking.
4. Adjust grading to improve workability; do not add water unless otherwise directed.
5. Maintain proportions, values, or factors of approved mixes throughout work.
6. Mix concrete in transit mixers five minutes immediately prior to discharge in addition to mixing as called for by ACI 304 and ASTM C94.

- C. Admixtures: Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.

2.5 SOURCE QUALITY CONTROL

A. The District's Testing Agency will:

1. Review mix designs, certificates of compliance, and samples of materials the Contractor proposes to use.
2. Test and inspect materials, as necessary, in accordance with ACI 318 and CBC Sections 1903A, 1705A and 1910A for compliance with requirements.
3. Take samples as required from the Contractor's designated sources.
4. Take one grab sample for each 100 tons of Portland cement except that, when used in bulk loading ready-mix plants where separate bins for pretested cement are not available, take grab samples for each shipment of cement placed in bin with not less than one sample being taken for each day's pour and subsequently test such samples if required by the Architect who may be so advised by DSA.
5. Test both coarse and fine aggregate by use of solution of sodium or magnesium sulfate, or both whenever in the judgment of the Architect such tests are necessary to determine quality of material. Perform such tests in accordance with ASTM C88. Loss shall not exceed 6-percent of either fine or coarse aggregate. Aggregate failing to comply with this requirement may be used in the Work provided it contains less than 2-percent of shale and other deleterious particles and shows a loss in soundness test of not more than 10-percent when tested in the sodium sulphate solution. Test aggregates as required by CBC Section 1705A.3.
6. Test for sand equivalent of fine aggregate in accordance with California Test 217.
7. Test for cleanness value of coarse aggregate in accordance with California Test 227.
8. Inspect plant prior to any work to verify following:
 - a. Plant is equipped with approved metering devices for determining moisture content of fine aggregate.
 - b. Other plant quality controls are adequate.
9. Continuously inspect quality and quantity of materials used in transit mixed concrete, in batched aggregates and ready-mixed concrete at mixing plant or other location where other materials are measured.

B. Waiver of Batch Plant Inspection:

1. Continuous batch plant inspection may be waived if the plant complies with ASTM C94 and has been certified by an agency acceptable to DSA to comply with the requirements of the National Ready Mix Concrete Association.
2. When batch plant inspection is waived, the following requirements shall apply:
 - a. Testing Agency shall check the first batching at the start of work and furnish mix proportions to the licensed Weighmaster.
 - b. Licensed Weighmaster shall identify material quantities and certify each load by a ticket.
 - c. Project Inspector shall collect truck mix tickets with load identification and maintain a daily record of placement. Trucks without a load ticket identifying the mix shall be rejected. Copies of daily placement record shall be submitted to DSA.
 - d. At the end of the project, the Weighmaster shall submit an affidavit to DSA certifying that all concrete supplied conforms to proportions established by mix designs.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine units of work to be cast and verify that:
 1. Construction of formwork is complete.
 2. Required reinforcement, inserts, and embedded items are in place.
 3. Form ties at construction joints are tight.
 4. Concrete-receiving places are free of debris.
 5. Dampen subgrade or sand course for slabs-on-grade. Do not saturate.
 6. Depths of depressed slab conditions are correct for delayed finish noted and for its proper bonding to concrete.
 7. Conveying equipment is clean and properly operating.
 8. The Architect has reviewed formwork and reinforcing steel and that preparations have been checked with the Project Inspector.
- B. Do not begin casting before unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Ensure availability of sufficient labor, equipment and materials to place concrete correctly in accordance with scheduled casting.
- B. Protect finished surfaces adjacent to concrete-receiving places.
- C. Clean transportation and handling equipment at frequent intervals and flush thoroughly with water before each day's run. Do not discharge wash water into concrete form.

3.3 PLACING

- A. The Inspector of Record, Architect, Structural Engineer, Testing Laboratory and DSA shall be notified at least 48 hours before placing concrete.
- B. Place concrete in accordance with CBC Section 1908A and ACI 318.

- C. Place concrete in cycles as a continuous operation to permit proper and thorough integration and to complete scheduled placement. Place no concrete where sun, wind, heat, or facilities prevent proper finishing and curing.
- D. Convey concrete as rapidly and directly as practicable to preserve quality and to prevent separation from rehandling and flowing; do not deposit concrete initially set. Complete placement of concrete within ninety (90) minutes after adding water unless otherwise noted. Retempering of concrete which has partially set will not be permitted.
- E. Take precautions to avoid damage to under-slab moisture barrier and displacement of reinforcement and formwork.
- F. Deposit concrete vertically in its final position. Avoid free falls in excess of six feet where reinforcement will cause segregation and in typical conditions unless the Architect approves otherwise.
- G. Keep forms and reinforcement clean above pour line by removing clinging concrete with wire brush before casting next lift. Also remove leakage through forms.
- H. Interruption in casting longer than 60-minutes shall be cause for discontinuing casting for remainder of day. In this event, cut back concrete and provide construction joints as the Architect directs; clean forms and reinforcement as necessary to receive concrete at a later time.
- I. Hot Weather Concreting: Conform to ACI 305 and following requirements when mean daily temperature rises above 75 degrees Fahrenheit.
 - 1. An upper temperature limit of concrete mixes shall be established by the Contractor for each class of concrete. Concrete temperature during placing shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints, and shall not exceed 90°F. Other project climatic conditions detrimental to concrete quality such as relative humidity, wind velocity, and solar radiation shall also be considered.
 - 2. Trial batches of concrete for each mix design shall be made at the limiting mix temperature selected. In lieu of trial batches, compression strength test reports (20 minimum) at the limiting temperature for each proposed mix shall be submitted to the District's testing laboratory for review.
 - 3. Practices to maintain concrete below maximum limiting temperature shall be in accordance with ACI 305. Concrete ingredients may be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for part of the mixing water.
 - 4. Practices to avoid the potential problems of hot weather concreting shall be employed by the Contractor in accordance with ACI 305.
 - 5. When the temperature of the reinforcing steel or steel deck forms is greater than 120°F, reinforcing and forms shall be sprayed with water just prior to placing the concrete.
- J. Cold Weather Concreting:
 - 1. No placement of concrete will be allowed at temperatures below 20 degrees Fahrenheit or if mean daily temperature for curing period is anticipated to be below 20 degrees Fahrenheit.
 - 2. No concrete placement will be allowed on frozen subgrade.
 - 3. Conform to ACI 306 and following requirements when mean daily temperature falls below 40 degrees Fahrenheit.
 - a. Reinforcement, forms or ground to receive concrete shall be completely free from frost.

- b. Concrete at time of placement for footings shall have temperature no lower than 50 degrees Fahrenheit, for all other concrete this minimum temperature at time of placement shall be 60 degrees Fahrenheit. Maximum temperature shall be 90 degrees Fahrenheit.
- c. Concrete shall be maintained at temperature no lower than 50 degrees Fahrenheit for minimum 7-day period after placement by means of blanket insulation, heaters, or other methods as approved by the Architect.
- d. Use of calcium chloride or admixtures containing calcium chloride as accelerators will not be permitted.
- e. The Contractor shall keep a record of concrete surface temperature for first 7-days after each pour. This record shall be open to inspection by the Architect.

K. Consolidating:

1. Use vibrators for thorough consolidation of concrete.
2. Provide vibrators for each location during simultaneous placing to ensure timely consolidation around reinforcement, embedded items and into corners of forms; ensure availability of spare vibrators in case of failures. Vibrate through full depth of freshly placed concrete.
3. Do not place vibrators against reinforcement, attach to forms, or use to spread concrete.
4. Exposed Concrete: Vibrate with rubber type heads and, in addition, spade along forms with flat strap or plate.

L. Construction Joints:

1. Verify location and conformance with typical details; provide only where designated or approved by the Architect. Comply with CBC Section 1908A. Construction joints require keys and additional reinforcement unless otherwise noted; consult architect for details.
2. All horizontal and vertical construction joints to be thoroughly sandblasted to clean and roughen entire surface to minimum 1/4-inch relief exposing clean coarse aggregate solidly embedded in mortar matrix.
3. Just prior to depositing concrete, the surface of the construction joint shall be thoroughly wetted.

M. Contraction (Control) Joints in Slabs-on-Grade:

1. Construct contraction joints in slabs-on-ground to form panels of patterns indicated on Shop Drawings. Use saw cuts 1/8" x 1/4 slab depth, unless otherwise indicated.
2. Time saw cutting to allow sufficient curing of concrete to prevent raveled or broken edges.
3. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
4. If joint pattern not shown, provide joints not exceeding 15' in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third-bays).

N. Walls and Other Formed Elements:

1. Space points of deposit to eliminate need for lateral flow. Placing procedures of concrete in forms permitting escape of mortar, or flow of concrete itself, will not be permitted.
2. Level top surface upon stopping work.
3. Take special care to fill each part of the forms by depositing concrete directly as near final position as possible, and to force concrete under and around reinforcement, embedded items, without displacement.

4. After concrete has taken its initial set, care shall be exercised to avoid jarring forms or placing any strain on ends of projecting reinforcement.
5. Where backfill is placed against a wall, it shall be adequately shored until it has attained design strength.

O. Penetrations Through Concrete:

1. Penetrations through structural concrete for conduit, piping or other items must be approved by the Architect.
2. Where such penetrations are approved, provide steel galvanized pipe sleeves as follows:
 - a. Reinforcement must not be displaced. Provide minimum $\frac{3}{4}$ " clearance between reinforcement and sleeve.
 - b. Sleeves shall be Schedule 40, 60, 80, or 160 as follows based on pipe diameter "D" per Table 3-1.
 - c. Spacing and edge distances shall conform to Table 3-1.

P. Table 3-1: Pipe Sleeves at Penetrations

Pipe Diameter "D"	A53 Pipe Thickness	Minimum Center-to-Center Spacing	Minimum Edge Distance
≤ 2"	Schedule 40	6"	4"
>2" ≤ 4"	Schedule 60	3D	6"
>4" ≤ 8"	Schedule 80	3½ D	1½ D
>8" ≤ 12"	Schedule 120	4D	2D
> 12"	Not Permitted		

3.4 CURING

A. General Requirements:

1. Take curing measures immediately after casting and for measures other than application of curing compound, extend for seven days. The Architect may recommend longer periods based upon prevailing temperature, wind and relative humidity. Comply with CBC Section 1908A.9.
2. Avoid alternate wetting and drying and fluctuations of concrete temperature.
3. Protect fresh concrete from direct rays of sun, rain, freezing, drying winds, soiling, and damage.
4. Do not permit curing method to affect adversely finishes or treatments applied to finish concrete.

B. Curing Method, Typical: Obtain the Architect's approval of alternate measures.

1. Keep forms and concrete surfaces moist during period forms are required to remain in place.
2. Apply curing compound per manufacturers' recommendations, except at slabs-on-grade apply curing compound at 150% of manufacturer's recommended application coverage rate.

3.5 CLEANING, PATCHING AND DEFECTIVE WORK

- A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing or is otherwise defective, and, in the Architect's judgment, these defects impair proper strength or appearance of the work, the Architect will require its removal and replacement at the Contractor's expense.
- B. Immediately after stripping and before concrete is thoroughly dry, patch minor defects, form-tie holes, honeycombed areas, etc., with patching mortar. Patch shall match finish of adjacent surface unless otherwise noted. Remove ledges and bulges.
- C. Compact mortar into place and neatly file defective surfaces to produce level, true planes. After initial set, dress surfaces of patches mechanically or manually to obtain same texture as surrounding surfaces.
- D. Rock Pockets:
 - 1. Cut out to full solid surface and form key.
 - 2. Thoroughly wet before casting mortar.
 - 3. Where the Architect deems rock pocket too large for satisfactory mortar patching as described, cut out defective section to solid surface, key and pack solid with concrete to produce firm bond and match adjacent surface.
- E. Cleaning:
 - 1. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds if permitted and other materials employed in work of concreting which would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.
 - 2. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.
 - 3. Remove all exposed, loose fibers from stair treads to the satisfaction of the architect.

3.6 PROTECTION

- A. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
- B. Protect exposed corners of concrete from traffic or use which will damage them in any way.
- C. Make provisions to keep all exposed concrete free from laitance caused by spillage or leaking forms or other contaminants. Do not allow laitance to penetrate, stain, or harden on surfaces which have been textured.

3.7 FIELD QUALITY CONTROL

- A. The District's Testing Agency will:
 - 1. Review concrete mix designs.
 - 2. Inspect concrete and grout placement continuously.
 - 3. Test concrete to control slumps according to ASTM C143.
 - 4. Continuously monitor concrete temperature as it arrives on the site.
 - 5. Test concrete for required compressive strength in accordance with ASTM C39/C39M:

- a. Make and cure four specimen cylinders according to ASTM C31 for not more than each 50 cubic yards, or 2000 square ft. for of surface areas of slab or walls poured each day.
 - b. Retain one cylinder for 7-day test, two for the 28-day test and hold one cylinder for additional testing as required.
 - c. Number each cylinder 1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D etc.; date each set; and keep accurate record of pour each set represents.
 - d. Transport specimen cylinders from job to laboratory after cylinders have cured for 24-hours on site. Cylinders shall be covered and kept at air temperatures between 60 and 80 degrees Fahrenheit.
 - e. Test specimen cylinders at age 7-days and age 28-days for specified strength according to ASTM C39.
 - f. Base strength value on average of two cylinders taken for 28-day test.
6. Test and inspect materials, as necessary, in accordance with ACI 318, MM Test Method 227 (Coarse Aggregates) and MM Test Method 217 (Fine Aggregates), for compliance with requirements specified in this section.

B. The Contractor shall:

1. Submit ticket for each batch of concrete delivered to job site. Ticket shall bear the following information:
 - a. Design mix number.
 - b. Signature or initials of ready mix representative.
 - c. Time of batching.
 - d. Weight of cement, aggregates, water and admixtures in each batch with maximum aggregate size.
 - e. Total volume of concrete in each batch.
 - f. Notation to indicate equipment was checked for contaminants prior to batching.
2. Pay the District's Testing Agency for taking core specimens of hardened structure and testing specimen according to ASTM C88 and C42 when laboratory tests of specimen cylinders show compressive strengths below specified minimum.
3. Submit Concrete Weighmaster affidavit per section 2.05 (B) 2.d.

3.8 FINISH OF FORMED SURFACES

- A. **Rough Form Finish:** For formed concrete surfaces not exposed-to-view in the finish Work or by other construction. Concrete surface shall have texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. **Smooth Form Finish:** For formed concrete surfaces exposed-to-view, or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
- C. **Related Unformed Surfaces:** At tops of walls, horizontal offsets and similar unformed surfaces occurring 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.

3.9 SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
 - 1. After placing slabs, plane surface to tolerances for floor flatness FF of 20 and floor levelness FL of 15. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances for flatness FF of 25 and levelness FL of 20. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab polished concrete, surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
 - 1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance. Check and level surface plane to tolerances flatness overall FF of 40 or better, local FF 20 or better, and levelness FL of 30 or better. Grind smooth surface defects which would telegraph through applied floor covering system.
 - 2. Floors to receive traffic topping shall have steel trowel finish.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- E. Medium Broom Finish: For concrete slopes with less than 6% slope, apply medium broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 CLEAN UP

- A. Perform Work under this Section to keep affected portions of building site neat, clean, and orderly. Remove, immediately upon completion of Work under this Section, surplus materials, rubbish, and equipment associated with or used in performance. Be aware that failure to perform clean-up operations within 24 hours of notice by Architect will be considered adequate grounds for having work done by others at no added expense to the District.

END OF SECTION

SECTION 03 33 00

ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for providing cast-in-place concrete having as-cast or treated surfaces as indicated and specified and includes all exposed-to-view concrete at buildings, adjacent enclosures and site walls unless otherwise indicated.
 - 1. Summary of Architectural Concrete:
 - a. Board-formed concrete with light sandblast finish to expose aggregate and surrounding matrix surfaces at exposed surfaces. Custom color to match Architect's Sample.
 - 2. Concrete shall comply with the applicable requirements specified in other Division 03 Sections and the requirements indicated on the Structural Drawings.
 - 3. Requirements in this Section are in addition to those specified in Section 03 30 00.
- B. Related Sections:
 - 1. Concrete formwork, reinforcing and cast-in-place concrete are specified in OTHER Division 03 Sections.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's product data, specifications with application and installation instructions for proprietary materials and items.
- C. Samples: Samples of specified materials. Include names, sources and descriptions.
- D. Layout Drawings: Show locations of proposed construction joints, control joints, and form tie location/pattern prior to placement. Layout drawings shall indicate dimensions for all surfaces, including openings. Dimensions to be derived from the documents including plans, details, notes and specifications.

1.03 QUALITY ASSURANCE

- A. Shoring and Bracing: Shoring and bracing shall be designed by an Engineer registered in the State of California. Costs of engineering shall be borne by the Contractor.
- B. Field Mock-up: Construct field mock-ups using procedures, equipment, materials, simulated repairs and quality control methods for production of cast-in-place architectural concrete. Begin fabrication of architectural forms upon acceptance of layout drawings. Upon approval of completed mock-up, begin fabrication of the architectural concrete forms. Maintain and protect field mock-ups on the Project site until final acceptance. Construct mock-ups in required color and texture.
 - 1. For walls, include vertical, horizontal and rustication joints. Demonstrate methods of repair, curing, aggregate, exposure, sealers and coating. Construct mock-up to include a minimum of two lifts having heights planned for placement of architectural concrete.

- C. Contractor shall provide a quality control project superintendent and forming and concrete subcontractors who are experienced in the construction of architectural concrete.
 - 1. The quality control project superintendent shall be trained for inspection of cast-in-place architectural concrete and have a minimum ACI Certification as a Level II Concrete Construction Inspector or equivalent.
- D. Reports:
 - 1. Maintain logs of concrete placements. Record date, location and quantities of concrete placement, air temperature, location and identification of material and architectural concrete sampling. Maintain file of architectural concrete delivery tickets.
 - 2. Report any proposed changes from procedures and materials used in the original field mock-up. Submit new sample having the same dimensions and texture as the original design reference sample for review. Upon acceptance, construct another field mock-up with the new materials and procedures for acceptance prior to proceeding further with construction of the concrete. Further construction with the new materials shall be planned so as to minimize contrast with previously placed architectural concrete.
- E. Periodic Acceptance: Failure of the completed concrete to receive acceptance during a periodic review requires the submittal of a plan of remedial repair and proposed revisions to methods of construction for acceptance before proceeding with additional architectural concrete construction.
- F. Final Acceptance: Protect accepted architectural concrete from damage after completion of the architectural concrete construction until completion of the Project.

1.04 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver materials to the Project site in manufacturer's original containers.
- C. Store materials in a clean dry location. Maintain method of storage and temperature of materials as required by manufacturer.

1.05 PRE-CONCRETE CONFERENCE

- A. At least 35-days prior to placement of architectural concrete, hold a meeting at the Project site to review the procedures for producing architectural concrete construction.
- B. Require responsible representatives of every party who is concerned with the concrete work to attend the conference, including Contractor, Contractor's superintendent, concrete subcontractor, ready-mix producer, admixture manufacturers, concrete manufacturer and supplier, and concrete pumping equipment manufacturer.
- C. Contractor shall take minutes of meetings and distribute to parties attending within 5-days. Transmit one copy to the Owner's Representative. Include a statement by the admixture manufacturer that the proposed design mix can produce the concrete quality required by the Specifications.

PART 2 - PRODUCTS

2.01 CONCRETE FOR ARCHITECTURAL CONCRETE

- A. Cement: Use only one source, type and brand.

- B. In addition to requirements specified in Section 03 30 00, Architectural Concrete shall be shrinkage controlled to a maximum of 0.045% at 56 days. Either intrinsically low shrinkage mix design or shrinkage control admixtures may be used at the Contractor's option.
- C. Water: Temperature of water for curing shall be not more than 20-deg. F. lower than the concrete surface temperature.
- D. Admixtures: Calcium chloride or admixtures containing calcium chloride shall not be used.
 - 1. Air-entraining agents shall comply with ASTM C260.
 - 2. Water-reducing admixtures shall meet ASTM C494, Type A.
 - 3. Water-reducing and retarding admixtures shall meet ASTM C494, Type D.
 - 4. High-range water reducers (superplasticizers) shall meet ASTM C494, Types F or G.
 - 5. Accelerating admixtures shall meet ASTM C494, Types C and E.
 - 6. Admixtures for flowing concrete shall meet ASTM C1017, Type I or II.
 - 7. Mineral admixtures fly ash shall meet ASTM C618, ground granulated blast-furnace slag shall meet ASTM C989, and silica fume shall meet ASTM C1240. Mineral admixtures shall be compatible with other admixtures.
 - 8. Coloring Admixture/Agents: Davis Colors, Scofield or approved equal, color as required to match approved mock-up, meeting ASTM C979 and ASTM C494.
- E. Concrete shall match appearance and surface of the accepted field mock-up.
- F. Concrete Strength: Concrete strength shall be as per the Structural Drawings.

2.02 BAR SUPPORTS

- A. Bar supports at exposed to view faces shall be all plastic, with minimal contact area on the form and grey in color to generally match the concrete.

2.03 FORMWORK FOR ARCHITECTURAL CONCRETE

- A. Design Criteria:
 - 1. Face sheet deflection shall not exceed 1/400 of its span.
 - 2. Maximum rate of placement assumed for design of formwork shall be indicated on the layout drawings.
 - 3. Concrete ties and bolts shall be sized to withstand form design pressures.
- B. Formwork, General:
 - 1. Unless otherwise indicated, all formwork shall have a high density overlay, Class 1, non-staining, non-vapor transmitting form face.
 - 2. Provide natural wood grain board formwork where indicated.
 - 3. Form face, form liner and molds shall produce a concrete surface matching field mock-up.

4. Use of phenolic coated formwork is specifically prohibited.
- C. Wood Forms for Board Formed Concrete Surfaces:
1. The appearance of the board formed concrete is subject to the approval of the mock-up for determining the standard of quality for architectural board formed concrete.
 2. Wood boards shall be of random length oriented as indicated. Board lengths shall be as long as practical, except not be less than full width for spans of 48-inches or less and not less than 48-inches elsewhere, with butt joints between adjacent boards spaced no closer than 12-inches apart. Outside corners exposed to view shall not be chamfered unless specifically indicated.
 3. Wood shall be new 1-inch thick x nominal 4-inch wide Vertical Grain Douglas Fir Grade C or better, free from open holes or other defects. Finished S1S2E with finished face towards concrete. Finger jointed boards are not acceptable.
 4. Form Ties: Provide FRP form ties of types and strengths required. Ties shall be ground off flush and smooth to surrounding concrete.
- D. Form Ties:
1. Form ties shall be factory-fabricated, glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 2. Form ties shall be 1-inch diameter at face of concrete.
 3. Washers shall not be used with snap ties except at concrete exposed to the weather.
 4. Where indicated, form tie holes shall be patched to match adjacent concrete to match approved field mock-up.
- E. Form Release Agents: Use only those tested and approved on field mock-up.
- F. Miscellaneous:
1. Compressible tape shall conform to AAMA 810.185 and be 1/4-inch thick.
 2. Sealant for form caulking shall conform to ASTM C920, Type a, Grade NS, or C834 that adheres to form joint substrates.
 3. Sheet materials for curing concrete shall be plastic film, wet burlap or burlap-backed plastic film.

2.04 ARCHITECTURAL TREATMENTS

- A. Aggregates for exposure shall conform to accepted field mock-up panel. Ensure adequate supply for architectural concrete.
- B. Forms and Form Liners: Use high density and non-vapor transmitting materials.
- C. Surface Retarders: Use those previously tested and accepted on field mock-up.
- D. Abrasive Material: Use that previously tested and accepted on the field mock-up for specified texture. Ensure adequate supply to complete total surface.

- E. Acid: Use muriatic or phosphoric acid to expose aggregate in locations indicated. Match accepted field mock-up.
- F. Water: Water for water blasting shall be free of oil or impurities capable of staining the concrete surface and shall be not more than 20-deg. F. cooler than the concrete surface at time of aggregate exposure.
- G. Sealers or Coatings: Use concrete sealers to match accepted field mock-up.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting application of special concrete finishes. Do not proceed with application until unsatisfactory conditions have been corrected.

3.02 REINFORCEMENT, TIE WIRE AND BAR SUPPORTS

- A. Provide specified concrete cover over reinforcement and coated steel embedments. Concrete cover shall be as indicated or specified after removal of rustication strips or face mortar by further treatment such as sandblasting or bush hammering.
- B. Use bar supports in sufficient number, size and location to prevent vertical displacement of the reinforcement and gouging of the forming. Use bar supports or spacers in walls and columns to maintain clear distance between reinforcement and face of concrete.
- C. Bend back and keep tie wires 1-1/2-inches from form face. Remove tie wire clippings from horizontal surfaces that will be sandblasted, exposed to view, or weather.
- D. Perform welding or similar heat process on reinforcement or accessories prior to form erection.

3.03 FORMWORK

- A. Comply with requirements specified in Section 03 30 00 and as specified below, whichever is more stringent
- B. Erect forms as indicated on accepted layout drawings. Construct forms for concrete exposed to view in the completed work full height and width between construction joints. Locate joints or breaks in concrete formwork only at construction joints and as indicated on the approved formwork drawings.
- C. Formwork for exposed to view location shall meet ACI 117 Class A requirements
- D. Re-Use of Forms: Refer to requirements specified below and per Section 03 30 00.
- E. Pour pockets are not allowed in architectural concrete exposed to view.
- F. Board Formed Concrete:
 1. Attach boards to plywood form backing using finish nails driven slightly below the surface. Use brad nailer or other means to not mar surface of wood while driving nails.
 2. Butt boards tightly together to minimized gaps and formation of fins in final concrete surface.

3. Align boards around corners and offsets and miter connections such that concrete is not cast against end grain where exposed to view.
 4. Do not reuse forms.
- F. Rustication Strips:
1. Provide rustication joints and chamfers as indicated.
 2. Wood strips shall be kerfed on the back side to aid removal without spalling concrete.
 3. Provide minimum concrete cover of 1-1/2-inch over all reinforcement. Cover shall be measured from bar reinforcement to the most deeply recessed depth of rustication or other recess in the concrete surface.
 4. Provide closure backing materials when indented rustication is used over a ribbed form liner. Seal joint between rustication strip and form with non-absorbent caulking.
 5. Apply impermeable coating to wood rustications or chambers.
 6. Rigidly attach rustications or chamfer to formwork so they are not displaced by concrete casting or other operations. Set fasteners flush to surfaces to receive concrete, such that the fasteners do not leave visible marks in concrete finish.
- G. Form Surface Preparation:
1. Treat form surfaces with approved form release agent.
 2. Where natural wood grain board forms are indicated, thoroughly wet inside face of forms immediately prior to placement of concrete to slightly raise the wood grain and saturate the surface to minimize the absorption of water from the concrete mix.
 - a. Do not allow water to puddle in the bottom of forms.
 3. Seal form joints and tie holes by taping or with non-absorbent caulking. Sealant shall be applied to abutting form edges and or outside face of formwork and not to inside face exposed to concrete.
 4. Clean taper ties and she-bolts and lubricate with a non-staining grease or form release agent before each use. Keep form face clean until concrete is placed.
- H. Form Stripping:
1. Strip formwork completely from vertical architectural concrete surfaces no sooner than 7-days after placement to ensure form removal does not damage concrete and to minimize drying shrinkage. Schedule formwork stripping to maintain surface appearance matching of accepted mock-up panel.
 - a. Do not use prybars in contact with architectural concrete to loosen forms.
 2. Grind off fiberglass ties flush with the surface of the concrete and texture to match the adjacent concrete surface and color. Match the appearance of accepted mock-up panel.
 - a. Do not damage surrounding concrete while cutting off ties.
- E. Cleaning and Storage:
1. Clean forms after each use.

2. Repair damaged forms such that repaired form will not leave color or texture differences in the finished concrete surface. Discard forms that cannot be adequately repaired.
3. Store steel forms horizontally, fully supported and protected against staining.
4. Store plastic coated forms and liners horizontally and under cover.

3.04 CONCRETE PLACEMENT

A. Batching, Mixing and Transporting:

1. Mix architectural concrete in accordance with requirements specified in Section 03 30 00. Add specified glass accent aggregate in proportions required to match appearance of approved mock-up.
2. Deliver concrete in initially clean equipment which is limited to mix and transport of the architectural concrete.
3. Deliver concrete of uniform slump and proportions so the resulting concrete will match the field mock-up.

B. Conveying and Placement:

1. Place concrete as specified in Section 03 30 00 and as specified below.
2. Schedule arrival of concrete to avoid delays in placement.
3. Take precautions to minimize mortar splatter on form faces. Remove accidental mortar splatter from architectural form face.
4. Support runs or gangways for the concrete transporters, pump lines, wheel barrows, other similar equipment and foot traffic so as not to disturb reinforcement or interfere with concrete placing operations.
5. In depositing concrete into columns or walls, provide tremies or other approved devices that will permit the concrete to be placed in a manner that will prevent segregation and accumulation of concrete on the forms or metal reinforcement above the level of the concrete. Limit free fall of concrete to not more than 3 feet. Do not move concrete horizontally using vibrators.
6. Where reinforcing steel congestion may limit placement, provide pre-installed, removable tremies such as PVC pipe, or other means, to introduce the concrete at the correct point.
7. Place concrete in uniform horizontal layers not more than 24-inches high for consolidation.
8. Place concrete continuously without exceeding rate of placement used in design of forms.
9. Vibrate placed concrete for maximum consolidation of concrete. Overlap the zones of influence a minimum of 50-percent. Withdraw internal vibrators at a rate of 3-inches per second. Keep internal vibrators 2-inches away from the architectural face.

10. Re-vibrate the top 6-inch layer of a concrete lift during delays of up to a maximum 30-minutes as long as the vibrator will penetrate of its own weight. After 30-minutes or failure of the vibrator to penetrate of its own weight, stop placement, level lift and set construction joint.
11. Provide form and/or rebar vibrators in addition to standard concrete vibrators in areas of reinforcing steel congestion, such as boundary zones, that may interfere with consolidation.
12. The presence of severe rock pockets, honeycombs, segregation, swirls, large air bubbles (bugholes), and similar items that are evidence of poor vibration and improper consolidation shall constitute sufficient basis for rejection of the work and the requirement for its complete replacement, if acceptable repairs cannot be made.

3.05 FINISHING

- A. Finish Concrete in accordance with ACI requirements except where more stringent requirements are required by this Section and/or Section 03 30 00.

3.06 CURING

- A. Mist concrete surfaces with water before applying curing compounds. Apply curing compounds at rate recommended by manufacturer.
 1. Maintain complete contact when using burlap curing cover.
 2. Maintain complete contact when using cotton mat curing.
 3. Curing during cold weather shall comply with ACI 306.1.

3.07 ARCHITECTURAL TREATMENTS:

- A. Aggregate Exposed by Abrasive Blast:
 1. Expose aggregate to match accepted field mock-up.
 2. Begin abrasive blasting to expose aggregate when the concrete has a minimum compressive strength of 2,000-psi and not less than that required for safe removal of the forms and supports. Blast exposed aggregate architectural concrete at the same age for uniform exposure and color.
 3. Wash abrasive blasting debris off the finished wall surface before drying occurs when abrasive grits contain free water for dust abatement.

3.08 REPAIRS

- A. Repair defects in exposed to view concrete surfaces to match color, texture, and uniformity of surrounding surfaces and to match repairs to approved mockups.
 1. Surface defects include color and texture irregularities, cracks, spalls, large air bubbles, honeycombing, rock pockets; fins and other projections on surface; and stains and other discoloration that cannot be removed by cleaning.
 2. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the Owner's Representative.
- B. Obtain approval of proposed repair and patching methods from the Owner's Representative proposed repair methods for each area prior to proceeding.

- C. Produce mock-ups of proposed repairs and receive approval prior to proceeding with repairs. Locate mock-ups in areas not exposed to view. If necessary, intentionally damage areas to provide mock-up locations.
- D. Acceptance of completed repairs or patching shall be at the discretion of the Owner's Representative. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the Owner's Representative.
- E. Patch defective areas with cement mortar as soon as possible after removal of forms.
 - 1. Cut out honeycombs, rock pockets, and voids over 1/4-inch and holes left by tie rods and bolts, down to solid concrete or to a depth of 1-inch, whichever is greater. Make edges of cuts perpendicular to concrete surface. Before placing patching mortar, clean, dampen with water, and brush-coat area to be patched with bonding agent.
 - 2. Patching mortar shall be an approved blend of white and grey Portland cement and fine sand as required to closely match the color and texture of adjacent concrete surfaces. Prepare test samples in approved location for approval by the Owner's Representative prior to general application.
 - 3. Where repairs are required that extend deeper than the face of reinforcing steel, obtain approval for and use appropriate structural repair materials for patching. Hold this material back from the finished surface of the concrete to allow final patching with mortar matching the color and texture of the surrounding surface.
 - 4. Moist cure repairs as required to minimize shrinkage and to maximize mechanical properties of repair materials. Repaired areas that erode due to pressure washing are not acceptable.
- F. Filling of Form Tie Holes: Unless otherwise noted, neatly patch form tie holes to match surrounding concrete, similar to concrete repair process. Protect surrounding concrete surfaces so they are not damaged or discolored by patching operations.

3.09 PRESSURE WASHING

- A. Pressure wash architectural concrete finishes to remove surface laitance and cement paste to achieve a uniform surface. Contactor shall work with the University Representative to develop waterblasting procedures, including the construction of three 2' x 2' samples on site each with increasing degrees of pressure washing. Samples shall be vertically cast to duplicate the anticipated as-cast architectural concrete surface. The samples shall also include areas that have been intentionally damaged and repaired to demonstrate the effect of pressure washing on such areas. The selected sample will be used as a reference for preparation of concrete surfaces in the Mock-Up that will serve as the standard for the Architectural Concrete Finish on the building.
- B. Do not pressure wash concrete surfaces or repair sooner than 28 days after placement to avoid excessive surface erosion.

3.10 FINISHING AND FINAL CLEANUP

- A. Protect completed architectural cast-in-place concrete surfaces from damage, staining or other contaminants by subsequent construction.
 - 1. For slabs to receive diamond polish floor finishing, provide protection from damage and/or staining in accordance with Section 03 54 19 requirements
- B. Do not allow laitance from subsequent construction or repairs to stain or harden on surfaces that have been finished.

- C. Clean concrete surfaces just prior to Project Acceptance.
- D. Wash and rinse surfaces to remove stains, markings, dust, and debris.
 - 1. Use cleaning materials and processes that do not change color or texture of the completed concrete surfaces.
 - 2. Protect other Work from staining or damage due to cleaning operations.

3.11 FINAL ACCEPTANCE

- A. Upon completion of architectural concrete, final acceptance is based upon the matching of the architectural cast-in-place concrete with the accepted mock-up when viewed at a distance of 10-feet in daylight.
- B. Defective work, including repair areas not accepted, shall be removed and replaced.

3.12 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 Construction Waste Management and Disposal for removal and disposal of construction debris and waste.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 03 54 19

CONCRETE FLOOR UNDERLAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing the following where required to prepare existing slab surfaces to receive new applied floor coverings:
 - 1. Concrete floor underlayment.
 - 2. Self-leveling concrete floor underlayment.

1.02 SUBMITTALS

- A. General: As specified in Section 01 33 00.
- 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 instructions for each product.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Regularly providing underlayment materials of types specified or approved for not less than 5-years.
- B. Installer: Approved by underlayment manufacturer using approved equipment.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Maintain a temperature above 50-degrees F. until subfloor surface has stabilized.
- B. Provide continuous heat and mechanical ventilation until floor underlayment is dry.
- C. Follow manufacturer's additional requirements.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Concrete Underlayment: Ardex, Inc. "Ardex SD-P Instantpatch", Bonsal B-1 Leveler" or approved equal.
- B. Self-Leveling Concrete Underlayment: Ardex, Inc. "Ardex K-15 Self-Leveling Underlayment Concrete", Bonsal "Self-Leveling Underlayment", Dayton Superior "Levelayer I", Gyp-Crete "Level-Right", Quickcrete "Self-Leveling Floor Resurfacer" or approved equal.

2.02 MATERIALS

- A. Primer: As recommended by underlayment manufacturer.
- B. Concrete Underlayment: Underlayment shall have a minimum compressive strength of 4,200-psi at 28-days. Underlayment shall be able to be installed from featheredge to 1-inch and up to 3-inches with aggregate. Minimum thickness shall be 1/8-inch.
- C. Self-Leveling Underlayment: Underlayment shall have a minimum compressive strength of 4,000-psi at 28-days. Self-leveling underlayment shall be able to be installed from featheredge to any thickness in one pour.

- D. Aggregate: Well-graded, washed gravel for use when underlayment is installed over 1-1/2-inch thick; size of aggregate as recommended by manufacturer.
- E. Water: Clean and potable.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Surfaces to receive underlayment shall be solid, clean and properly primed.
- B. Concrete subfloors shall be clean and free of oil, grease, dirt, curing compounds, and other items that may act as bond breakers. Mechanically clean if required using shot-blasting; acid etching is not acceptable.
- C. Where required, grind high spots in concrete subfloors as recommended by manufacturer.
- D. Wood subfloors shall be clean and free of foreign matter. Sand to bare wood and vacuum to remove dust. Re-nail loose boards.
- E. Non-porous surfaces such as tile shall be clean and free of wax and sealers.
- F. Repair cracks in the subfloor to prevent telegraphing through the underlayment.

3.02 INSTALLATION

- A. Prime subfloor in accordance with manufacturer's recommendations. Do not leave any bare spots and remove puddles and excess primer. Do not apply underlayment until primer is dry.
- B. Mixing Ratios: In accordance with manufacturer's instructions.
- C. Place underlayment using a wood or magnesium float. When underlayment begins to harden, finish with a steel trowel.
- D. Pour or pump self-leveling liquid underlayment and spread in place. Comply with manufacturer's instructions.
- E. Prohibit foot traffic until underlayment is dry.

3.03 COMPLETION

- A. When complete, underlayment shall be finished to a reasonably smooth and uniform condition, and be free from pin holes, gouges, cuts, and other damage or defects.
- B. Transition between finish surfaces of underlayment and adjacent existing flooring shall be free from offsets.

END OF SECTION

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Formed steel stud exterior wall and interior wall framing.
- B. Exterior wall sheathing.
- C. Formed steel joist and purlin framing and bridging.
- D. Water-resistive barrier over sheathing.

1.2 RELATED REQUIREMENTS

- A. Section 07 21 00 - Thermal Insulation: Insulation within framing members.
- B. Section 07 25 00 - Weather Barriers: Weather barrier over sheathing.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Head and sill flashings.
- D. Section 07 92 00 - Joint Sealants.
- E. Section 09 29 00 – Gypsum board
- F. Section 09 24 00 - Cement Plastering.
- G. Section 09 51 13 - Acoustical Ceilings: Ceiling suspension system.

1.3 REFERENCE STANDARDS

- A. California Code of Regulations, Title 24, Part II, 2019 Edition with DSA Amendments, also known as California Building Code (CBC).
- B. AISI S100-16 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2016.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- E. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2015.
- F. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a (Reapproved 2015).
- G. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014a.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (with March 2016 Errata).
- I. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2008.
- J. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc; 2013.
- K. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.5 SUBMITTALS

- A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- C. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Indicate stud and ceiling joist layout.
 - 2. Describe method for securing studs to tracks and for bolted framing connections.
- D. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Metal Framing:
 - 1. CEMCO; www.cemcosteel.com.
 - 2. ClarkDietrich Building Systems; www.clarkdietrich.com.
 - 3. The Steel Network, Inc; www.SteelNetwork.com.
 - 4. Substitutions: See Section 01 25 13 - Product Options and Substitutions
- B. Framing Connectors and Accessories:
 - 1. Same manufacturer as metal framing.
 - 2. ClarkDietrich Building Systems; www.clarkdietrich.com.
 - 3. Simpson Strong Tie; www.strongtie.com.
 - 4. Substitutions: See Section 01 25 13 - Product Options and Substitutions

2.2 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Shop fabricate framing system to the greatest extent possible.
- C. Deliver to site in largest practical sections.

2.3 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Gage and Depth: As indicated on the drawings.

2. Products:
 - a. CST-SLP-TRK with horizontal slots by CEMCO per ESR 2012.
 - b. Substitutions: See Section 01 25 13 - Product Options and Substitutions
- B. Joists and Purlins: Fabricated from ASTM A653/A653M steel sheet, with G90/Z275 hot dipped galvanized coating.
 1. Base Metal: Structural Steel (SS), Grade 33/230, or unless otherwise noted.
 2. Gage and Depth: As indicated on the drawings.
- C. Framing Connectors: Factory-made, formed steel sheet.
 1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch, and factory punched holes and slots.
 2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-16.
 3. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
 - a. Where continuous studs bypass elevated floor slab, connect stud to slab in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
 - b. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
 - c. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 10 feet.
 4. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
 5. Wall Stud Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connections where indicated on the drawings.
 6. Products:
 - a. TSN Verticlip per ESR 2049

2.4 WALL SHEATHING

- A. Wall Sheathing: Gypsum; complying with requirements of ASTM C1396/C1396M for gypsum sheathing, V-shaped long edges, 5/8 inch Type X fire resistant.

2.5 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.
- C. Water-Resistive Barrier: As specified in Section 07 25 00.

2.6 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
 1. Products:
 - a. ITW Commercial Construction North America; ITW CCNA-Buildex Tek's Select Series; www.ITWBuildex.com.

- b. Substitutions: See Section 01 25 13 - Product Options and Substitutions
- B. Anchorage Devices: Powder actuated and Drilled expansion bolts. See Structural Drawings.
- C. Welding: In conformance with AWS D1.1/D1.1M.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.

3.2 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener method.
- C. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- D. Install load bearing studs full length in one piece. Splicing of studs is not permitted.
- E. Install load bearing studs, brace, and reinforce to develop full strength and achieve design requirements.
- F. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- G. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- H. Attach cross studs to studs for attachment of fixtures anchored to walls.
- I. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- J. Touch-up field welds and damaged galvanized surfaces with primer.

3.3 INSTALLATION OF JOISTS AND PURLINS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Make provisions for erection stresses. Provide temporary alignment and bracing.

3.4 WALL SHEATHING

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.
 - 1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.

END OF SECTION

SECTION 05 50 00 LANDSCAPE METAL FABRICATIONS

PART 1 - GENERAL

1.01 INCLUDED WORK

- A. All metal work indicated and detailed on the Landscape Drawings.
- B. Shop prime coat painting and galvanized finishes.

1.02 RELATED WORK:

- A. Section 32 13 13 – Concrete Paving

1.03 REFERENCES AND STANDARDS

- A. Shop Detailing and Fabrication Practices: Conform to the standards of the National Association of Architectural Metal Manufacturers (NAAMM) in the Architectural Metal Handbook, latest edition.
- B. Welding: Comply with American Welding Society (AWS) Structural Welding D1.1 Qualify welding procedures, welders, and welding operations in accordance with AWS Standard Qualifications Procedure.
- C. Structural Steel: Design, details, fabrication, and erection shall comply with American Institute of Steel Construction (AISC) standards:
 - 1. Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.
 - 2. Code of Standard Practice for Steel Buildings and Bridges.
- D. Aluminum Fabrications: comply with Architectural Aluminum Manufacturer's Association (AAMA) Design Manual.
- E. American Society for Testing and Materials, (ASTM).

1.04 QUALITY ASSURANCE

- A. Metal fabrications work shall comply with these specifications and all applicable sections of the above named References and Standards.

Section 05 50 00
Landscape Metal Fabrications

1.05 SUBMITTALS

- A. Submit manufacturer's product data, specifications, and installation instructions for factory fabricated items, including paint products.
- B. Submit shop drawings. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle metal fabrication items to prevent damage and deterioration.
- B. Stack assembled items off the ground.

1.07 PROJECT CONDITIONS

- A. Coordinate metal fabrications work with trades furnishing items that will attach to members for proper positioning.
- B. Provide sleeves, anchors, inserts, clips, and other items furnished under this Section and built in with work of other trades.
- C. No work shall be fabricated until shop drawings for the work have been reviewed and accepted.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Metal Surfaces: Provide materials exposed to view smooth and free of pitting, seam marks, roller marks, rolled trade names and roughness.
- B. Steel Plates, Structural Shapes and Bars: ASTM A36
- C. Steel Pipe: ASTM A53, Grade A, schedule 40 unless otherwise indicated.
- D. Steel Bars and Bar-size Shapes: ASTM A-306, Grade 65, or ASTM A-36.
- E. Steel Tubing: ASTM A501.
- F. Stainless Steel: Type 304, ASTM A276.
- G. Grey Iron Castings: ASTM A48, Class 30.
- H. Grout: CE CRD C588, nonshrink, nonferrous type; Master Builder's "EMBECO" or equal.
- I. Welding Electrodes: ASTM A233, Series E60 or E70.

- J. Fasteners: Provide hot-dip galvanized or stainless steel fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
 - 1. Bolts and nuts: Regular hexagon head type, ASTM A307, Grade A.
 - 2. Lag bolts: Square head type, FS FF-B-561.
 - 3. Machine screws: Steel, FS FF-S-92.
 - 4. Masonry and concrete anchorage devices: threaded or wedge type; galvanized ferrous castings, malleable iron ASTM A47 or cast steel ASTM A27. Provide bolts, washers and shims as required, hot dipped galvanized ASTM A153.
 - 5. Stainless Steel: type 304, ASTM 269.
- K. Concrete Anchors:
 - 1. Expansion Bolts: ITW Ramset/Red Head "Stud Anchor", or Star "Stud Bolt", or Rawl "Set-Bolt", plug type stud bolt anchor.
 - 2. Expansion Shields for Machine Bolts: ITW Ramset/Red Head "Self-Drill Anchor" or Star "Selfdril Shield, or Rawl "Saber-Tooth", threaded self-drilling plug type anchor.
- L. Galvanizing: Provide zinc coating for all site iron and steel fabrications, unless otherwise indicated, as follows:
 - 1. ASTM A153, for galvanizing iron and steel hardware.
 - 2. ASTM A123, for galvanizing rolled, pressed, and forged steel shapes, plates, bars, and strips 1/8" thick and heavier.
 - 3. ASTM A386, for galvanizing assembled steel products.
 - 4. Galvanizing repair paint: High zinc dust content paint for repair of galvanized finishes.

2.02 FABRICATION

- A. Provide all miscellaneous steel angles, channels, tees, zee-bars, plates and shapes, threaded rods, pipe, tubes, bolts, nuts, washers, spacers, and fastenings required to complete the work whether shown on the Drawings or not.
- B. Fabricate work in accordance with reviewed and accepted shop drawings and referenced standards.
- C. Weld shop connections, except as otherwise indicated. Grind all exposed welds smooth.
- D. Provide joints and intersections tight fitting and securely fastened.
- E. Provide metal fabrications work square, plumb, straight, and within allowable tolerances.
- F. Drill or punch all holes required for attachment of other work and bolted connections. Burned holes are not acceptable.
- G. Bend or form pipe and other members to continuous and true curves, with joints neatly fastened and assembled.

- H. Provide for anchorage of type required, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
- I. Preassemble items in shop to greatest extent possible to minimize field fitting and assembly.

2.03 SHOP PRIME PAINTING

- A. Shop prime paint all exposed iron and/or steel metal work and those portions of aluminum work to be embedded in concrete or mortar.
- B. Surface Preparation: After inspection and before shipping to the job site, clean steel work to be painted, in compliance with the Steel Structures Painting Council (SSPC) SP-2, Hand Tool Cleaning, SSPC SP-3, Power Tool Cleaning, or SSPC SP-7, Brush Off Blast Cleaning. Remove oil, grease, and similar contaminants, complying with SSPC SP-1, Solvent Cleaning.
- C. Application: Immediately after surface preparation, apply structural steel primer paint in accordance with the manufacturer's instructions and at a rate to provide a uniform dry film thickness of 2.0 mils. Use painting methods that will result in full coverage of joints, corners, edges and all exposed surfaces.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the substrate under which metal fabrications are to be installed. Notify the Architect, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Provide sleeves and anchorages that are built into concrete or masonry construction. Furnish templates, setting drawings, and instructions for installation of sleeves and anchorages.
- B. Set hardware that is shop installed.

3.03 INSTALLATION

- A. Assemble and install metal fabrications in accordance with approved shop drawings.
- B. Perform fitting required for installation. Set the work accurately in location, alignment, and elevation free of rack, measured from established lines and levels. Assembled metal fabrications shall be firm, rigid, free of rattle, and provide maximum protection against tampering and vandalism.
- C. Fit exposed connections accurately together to provide flush, tight hairline joints.

- D. Adjust handrails and railings before securing in place to ensure proper matching at butting joints and proper alignment throughout their length. Space posts as indicated. Plumb posts in each direction.
- E. Coat ends of aluminum posts set in grout with bituminous paint or zinc chromate primer.
- F. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas, and repaint with the same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

3.04 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from metal fabrications work.
- B. Upon completion of installation, clean factory finished metal fabrication items in accordance with manufacturer's cleaning instructions. Exercise care to avoid damage to the finish coating.

END OF SECTION

Section 05 50 00
Landscape Metal Fabrications

FORMED METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing ornamental formed sheet metal fabrications, including but not limited to the following:
 - 1. Prefinished formed sheet metal at building façade locations.
- B. Related Sections:
 - 1. Metal fabrications are specified in Section 05 50 00.
 - 2. Sheet metal flashing and trim is specified in Section 07 62 00.
 - 3. Joint sealants are specified in Section 07 92 00.

1.2 SUBMITTALS

- A. General: Comply with the requirements in Division 01.
- B. Shop Drawings: Submit large scale shop drawings showing materials, details, sections, dimensions, joints, fasteners, provisions for thermal movement, metal thickness, finishes, and methods of attachment to supporting construction. Show proposed location of all joints exposed to view in the completed work.
- C. Samples: 8-inch square sample of each metal and finish required. Prepare on same material and gauge to be used for the work. Include a typical seam. Resubmit samples until approved by the Architect.
- D. Fabricator's Qualifications: Furnish evidence that the proposed fabricator of this work has a minimum of 5-years successful experience fabricating, finishing and installing similar work.
- E. Warranty.

1.3 QUALITY ASSURANCE

- A. Fabricator shall have a minimum of 5-years' experience in the fabrication of formed metal fabrications similar to those required for this Project.
- B. Thermal Movements: Fabricate and install exterior formed metal fabrications capable of withstanding thermal expansion and contraction movements for an ambient temperature change of 120-deg. F. resulting in a surface temperature variation of 180-deg. F. without failure, including air and water leakage when tested in accordance with ASTM E283 and E331, and without noise from metal-to-metal contact in movement.
- C. Weather Tightness: When tested in accordance with AAMA 501.1, exterior formed metal fabrications shall show no leakage when exposed to a dynamic rain and wind velocity of 70-mph for 5-minutes.
- D. Sheet Metal Flatness: Fabricate exterior sheet metal fabrications to be free of oil-canning and other imperfections, and as required to span support members. Reinforce sheet metal or increase thickness at fabricator's option. Reinforcements shall not interfere with sheet metal attachment to supporting members. Where fabrications are accessible to pedestrian traffic, increase sheet metal thickness to resist denting from impact loads.
- E. Exterior Formed Metal Fabrications: Provide assemblies capable of withstanding design wind loads with deflection not greater than 1/180 of span.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. General: Comply with the requirements in Division 01.
- B. Wrap prefinished formed metal fabrications in heavy cardboard or other suitable protective coverings before shipment to protect against damage during transit and handling.
- C. Store sheet metal in a dry, well-ventilated place to prevent condensation.
- D. Do not allow sheets or other components to come in contact with mud, uncured concrete, cement, lime, and other strong chemicals which, in the presence of moisture, might cause staining.

1.5 WARRANTY

- A. Exterior formed metal fabrications shall be weather tight for 5-years following date of Substantial Completion.
- B. Aluminum Finish: Warrant factory-applied exterior finish for a period of 20-years from date of Substantial Completion. Repair or replace fabrications that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.
- C. This warranty is in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Metal sheets shall be selected for straightness and flatness, and shall be free of fabrication marks, dents, scratches, oil canning or other imperfections. Where thickness of sheet metal is not indicated or specified, provide thickness required to prevent oil canning or other imperfections.
- B. Aluminum Sheet: Alloy and temper recommended by manufacturer for intended use, minimum .050-inch thick unless thicker sheets are recommended by fabricator for required uses.
 - 1. Where color anodized finish is indicated, exposed surfaces shall be finished with a Class I integral or electrolytically-deposited color anodized finish conforming to AA-M12C22A42/A44, color as selected by the Architect from within standard industry colors and color density range.
 - 2. Where clear anodized finish is indicated, exposed surfaces shall be finished with a Class I clear anodized finish conforming to AA-M12C22A41.
 - 3. Where Kynar finish is indicated, exposed surfaces shall be finished with a full-strength 70-percent "Kynar 500" or "Hylar 5000" coating baked on for 15-minutes at 450-deg. F. to dry film thickness of 1.0-mil over 0.3-mil baked on epoxy primer. Custom color to match color sample furnished by the Architect.
 - a. Finish shall have been field tested under normal range of weathering conditions for minimum of 20-years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of No. 8 in accordance with ASTM D659; and without fading in excess of 5 NBS units.
- C. Concealed Fasteners: Material shall same basic metal as the metal fastened. Do not use metals that are corrosive or incompatible with materials joined.
- D. Accessories: Provide components required for a complete installation, including clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

1. Sealing Tape: Pressure-sensitive, 100-percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining type.
 2. Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone rubber sealant as recommended by panel fabricator. Comply with requirements specified in Section 07 92 00.
- E. Adhesives: As recommended by formed metal fabricator for laminating sheet metal to backing materials.

2.2 FABRICATION

- A. Maintain the visual design concepts shown, including member sizes, profiles and alignment. Verify supporting dimensions affecting this work prior to beginning fabrication.
- B. Design and fabricate sheet metal fabrications to permit installation on fully concealed mounting devices. Design and fabricate exterior items to accommodate thermal movement caused by a surface temperature variation of 180-deg. F. without wrinkling, buckling, leaking, causing undue stress on fasteners, or other detrimental effects. Fabricate the work to permit its thermal movement within each individual component without the need for separate expansion joints.
- C. Use materials that are smooth and free of blemishes such as pitting, seam marks, roller marks, trade names and roughness for work exposed to view. Metal surfaces shall be flat and square, free of oil canning, dents, scratches, or other defects.
- D. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise damaging the work.
- E. Form sheet metal items in lengths to minimize joints or to result in joints only where indicated. Fold back exposed ends of unsupported sheet metal to form a 1/2-inch wide hem on the concealed size, or ease exposed edges with backing to a radius of approximately 1/32-inch.
- F. Provide straps, plates and brackets as required for support and anchorage of fabricated items.
- G. Reinforce sheet metal items as required for attachment and support of other work.
- H. Fabricate prefinished metal fabrications to profiles indicated. Design joints between adjacent pieces to form weathertight seams. Locate joints only where indicated on reviewed shop drawings.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect adjacent construction and make sure that all conditions detrimental to the proper and timely execution of this work have been corrected before proceeding.

3.2 INSTALLATION

- A. Provide anchorage devices and fasteners required to attach sheet metal fabrications to supporting construction.
- B. Perform cutting, drilling and fitting required for installation. Install sheet metal fabrications accurately in proper location, alignment and elevation, plumb, level, free of rack as measured from established lines and levels.
- C. Fit exposed joints tightly and accurately to form hairline joints. Fasteners shall be concealed.
- D. Installation Tolerances:
 1. Provide adjustment within the work to accommodate job variations.

2. Installed components shall conform to the following tolerances:
 - a. Deviation from established vertical, horizontal, or designed position shall not exceed 1/8-inch per 12-foot of length of any member, or 1/4-inch in any total run in any line.
 - b. Maximum offset from true alignment between two consecutive members placed end-to-end shall not exceed 1/16-inch.
- E. Anchorage:
 1. Anchor components securely with concealed bolts, screws or other permanent mechanical attachment systems that permit required movement. Install slip-joint linings where required to permit movement for thermal expansion and contraction.
 2. Provide tape separators between contact surfaces of dissimilar materials where there is a possibility of corrosive or electrolytic action.
- F. Install exterior sheet metal fabrications to provide a leak-proof, secure, and corrosion-resistant installation. Shim and align panels within specified erection tolerances. Make provisions to drain condensation to the exterior where indicated on reviewed shop drawings.
- G. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4-inch in 20-feet on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.3 PROTECTION AND REPLACEMENT

- A. Protect installed components from damage such as scratched surfaces, dents, nicked edges, and other defects until their acceptance. Replace components damaged beyond satisfactory field repair before their acceptance, with new ones at no additional cost to the Owner.

END OF SECTION

SECTION 06 16 43

GYPSUM SHEATHING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section includes exterior gypsum wall sheathing, fasteners, and accessories.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Fluid-applied weather-resistive air and moisture barrier membrane is specified in Section 07 27 00.
 - 3. Gypsum board is specified in Section 09 29 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's descriptive literature indicating material composition, thickness, size and fire resistance. Include manufacturer's certification that gypsum sheathing complies with specified fire-resistance requirements.
- C. Shop Drawings: Show fastener patterns and installation details.

1.03 QUALITY ASSURANCE

- A. Fire Resistance Ratings: Gypsum sheathing shall have a flame spread of 0 and smoke developed of 0 when tested in accordance with ASTM E84 and be non-combustible when tested in accordance with ASTM E136.
- B. Gypsum sheathing shall be manufactured to conform to the physical requirements of ASTM C79 for gypsum sheathing board and shall have the following performance characteristics.

	1/2" thick Sheathing	5/8" thick Sheathing
Thickness	1/2" +/- 1/32"	5/8" +/- 1/32"
Weight, lbs/sq. ft.	1.900	2.500
Width, nominal	4 feet +/- 1/8"	4 feet +/- 1/8"
Length, standard	8 feet and 10 feet, +/- 1/4"	8 feet and 10 feet, +/- 1/4"
Edges	Square	Square
Core	Water resistant	Water resistant
Permeance, ASTM E96	23.1 perms	12.4 perms

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Keep materials under cover and dry. Protect against exposure to weather and contact with wet or damp surfaces.
- C. Stack gypsum sheathing and provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.01 GYPSUM SHEATHING

- A. Gypsum Wall Sheathing: Georgia Pacific "DensGlass Sheathing", USG "Securock" or approved equal panel with glass mat faced water-resistant treated core, 1/2-inch thick unless otherwise indicated, complying with ASTM C1177.
 - 1. Gypsum wall sheathing shall be resistant to mold and mildew when tested in accordance with ASTM D3273.

2. Where indicated for fire-rated walls, provide Georgia Pacific "DensGlass Fireguard", USG "Securock" or approved equal glass mat faced water-resistant treated core panel, 5/8-inch thick, with Type X rating as defined in ASTM C1396.
- B. Fire Resistance:
1. Noncombustible when tested in accordance with ASTM E136.
 2. Flame spread 10, smoke developed 0, when tested in accordance with ASTM E84.
- D. When tested in accordance with ASTM E119, 1/2-inch thick sheathing demonstrated that it met the code requirements for use as a 15-minute thermal barrier for protecting foam plastics which might be installed as a part of an exterior wall covering assembly.
- E. When Tested in accordance with ASTM E119, 5/8-inch sheathing applied to a partition in a single-layer nail application on each face of load-bearing wood framing members provided a one-hour fire resistance, qualifying it for the "Type X" designation of ASTM C79.

2.02 MISCELLANEOUS MATERIALS

- A. Fasteners: Provide bugle or wafer head, self-tapping, corrosion-resistant, fine thread fasteners as recommended by gypsum sheathing manufacturer. Fasteners shall have a minimum 1,000-hour resistance to salt spray when tested in accordance with ASTM B117.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Cut and fit gypsum sheathing accurately. Install members plumb and true to line and level.
- B. Securely attach to substrate by anchoring and fastening as indicated and required.
- C. Use fasteners of appropriate type and length.

3.02 GYPSUM WALL SHEATHING

- A. Provide gypsum board sheathing where indicated.
- B. Fasten to exterior face of stud framing for exterior walls in accordance with manufacturer's instructions, applicable instructions in GA-253 and ASTM C1280.
- C. Use maximum lengths possible to minimize number of joints.
- D. Fasten with screws of appropriate type and length.
- E. Attach sheathing to metal framing with screws spaced 8-inches o.c. at perimeter where there are framing supports and 8-inches o.c. along intermediate framing in field.
- F. Drive fasteners to bear tight against and flush with surface of sheathing. Do not counter sink.
- G. Locate fasteners minimum 3/8-inch from edges and ends of sheathing panels, tight against and flush with surface of sheathing.
- H. For transverse wind load resistance, comply with the requirements specified in ICC-ES ER-4305.

3.03 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 06 40 23

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing interior architectural woodwork items including the following:
 - 1. Interior millwork and trim.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Architectural wood casework is specified in Section 06 41 00.
 - 3. Flush wood doors are specified in Section 08 14 16.
 - 4. Painting is specified in Section 09 91 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Shop Drawings: Show details of fabrication and installation, dimensioned plans, elevations, and sections.
 - 1. Shop drawings shall comply with North American Architectural Woodwork Standards (NAAWS) Section 1 – Submittals.
 - 2. Apply a Woodwork Institute Certified Compliance Label to the first page of the shop drawings.
- C. Samples, as Applicable:
 - 1. Lumber with or for transparent finish, 50-square inches, for each species and cut, finished on one side and one edge.
 - 2. Veneer leaves representative of and selected from flitches to be used for transparent finished woodwork.
 - 3. Wood veneer panel products, with or for transparent finish, 8-1/2-inches by 11-inches for panels and 50-square inches for lumber, for each finish system and color, with one half of exposed face finished.
 - 4. Corner pieces of miter joints for standing trim.
- D. Product certificates signed by woodwork manufacturer certifying that products comply with specified requirements.
- E. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other specified information.

1.03 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm experienced in producing architectural woodwork similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the work.

- B. Installer Qualifications: Arrange for interior architectural woodwork installation by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this Project.
- C. WI Certified Compliance Program (CCP):
 1. Before delivery to the Project site, provide a Woodwork Institute Certified Compliance Certificate indicating the products being furnished and certifying that they meet the requirements of the NAAWS and of the plans and specifications
 2. Upon completion of installation, furnish a WI Certified Compliance Certificate for the installation.
 3. In the event of question as to compliance with the referenced standard of any item of work, the Architect may require independent inspection service of questioned items as specified in "Independent Inspection Service" of "WI Services and Quality Control Options" published by the WI.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.
- C. Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet specified requirements.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.

1.06 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work to ensure that interior architectural woodwork can be supported and installed as indicated.
- B. Fabricated woodwork shall be left in a well ventilated warehouse for a minimum of 72-hours prior to delivery to the Project site.

1.07 INDOOR AIR QUALITY

- A. Do not use wood products containing urea formaldehyde glues inside the shell of the building.
- B. When machining plastic products, protect surrounding areas from dust.
- C. VOC limits shall comply with the limits established by the listed standards.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide materials that comply with requirements of the NAAWS for each type of woodwork and NAAWS quality grade specified.

- B. Lumber Standards: Comply with PS 20 for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.
- C. Plywood Standards: Comply with PS 1 or APA PRP-108.
 - 1. Plywood products shall contain no added urea-formaldehyde as a binder.
- D. Particleboard: One of the following at Contractor's option:
 - 1. Particleboard complying with ANSI A208.1, Grade M-2, made with binder containing no urea-formaldehyde resin.
 - 2. Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.
- E. Medium Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
- F. Furring, Blocking, Shims and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15-percent moisture content.
- G. Screws: Material, type, size, and finish required for each use.
- H. Nails: Material, type, size, and finish required for each use.
- I. Anchors: Material, type, size, and finish required for each substrate for secure anchorage.
- J. Glue: VOC-compliant type as recommended by manufacturer for general carpentry use.
- K. Adhesives: VOC-compliant type as recommended by manufacturer. Do not use adhesive that contain urea formaldehyde.

2.02 FABRICATION, GENERAL

- A. Comply with NAAWS requirements for the grade specified.
- B. Wood Moisture Content: Comply with requirements of referenced quality standards for moisture content of lumber in relation to relative humidity conditions existing at time of fabrication and in installation areas.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to a radius as follows:
 - 1. Corners and edges of solid wood members less than 1-inch in nominal thickness: 1/16-inch.
 - 2. Edges of rails and similar members more than 1-inch in nominal thickness: 1/8-inch.
- D. Complete fabrication, including assembly and finishing before shipment to Project site to maximum extent possible. Disassemble components only as required for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- E. Shop-cut openings to maximum extent possible. Locate openings accurately and use templates for roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges and cutouts.

2.03 MILLWORK AND TRIM FOR TRANSPARENT FINISH

- A. Grade: Premium.
- B. Back-out or groove backs of flat trim members and kerf backs of other wide flat members. Back miter exposed ends to conceal relieved or grooved backs.

- C. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- D. Lumber Species and Cut: FSC-certified, as indicated in the Finish Legend on the Drawings.
- E. Finish: Field-applied finish as specified in Section 09 91 00.

2.04 MILLWORK AND TRIM FOR OPAQUE FINISH

- A. Grade: Custom.
- B. Backout or groove backs of flat trim members and kerf backs of other wide flat members. Back miter exposed ends to conceal relieved or grooved backs.
- C. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- D. Lumber Species: FSC-certified poplar or other closed-grain hardwood listed in referenced woodworking standard.
- E. Finish: Shop primed for field-applied paint finish as specified in Section 09 91 00.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.02 INSTALLATION

- A. General: Install interior architectural woodwork in accordance with NAAWS for same grade specified for woodwork involved.
- B. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8-inch in 8'-0" for plumb and level.
- C. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.
- E. Millwork and Trim: Install with minimum number of joints possible, using full-length pieces to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns and miter at corners.

3.03 ADJUSTMENT AND CLEANING

- A. Repair damaged and defective woodwork where possible to eliminate defects functionally and visually; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean woodwork on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.04 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer, to ensure woodwork is without damage or deterioration at time of final acceptance.

3.05 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13.
- B. Separate the following categories for salvage or re-use on the site:
 - 1. Sheet materials larger than 2-sq. ft.
 - 2. Solid wood trim longer than 16-inches and multiple offcuts of any size larger than 12-inches.
- C. Separate the following for recycling. Material shall be placed in source-separated or comingled recycling bins.
 - 1. Composite wood.
 - 2. Clean dimensional lumber.
- D. Separate the following categories for disposal and place in designated areas for hazardous materials:
 - 1. Treated, stained, painted, or contaminated wood.

END OF SECTION

ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing architectural wood casework, including but not limited to the following:
 - 1. Custom plastic laminate faced cabinetwork.
 - 2. Plastic laminate faced countertops.
- B. Related Sections:
 - 1. Interior architectural woodwork is specified in Section 06 40 23.

1.2 SUBMITTALS

- A. General: Comply with the requirements in Division 01.
- B. Samples: Specified plastic laminate colors for verification of initial selections.
- C. Shop Drawings: Show details of fabrication and installation, dimensioned plans, elevations, and sections. Each set of shop drawings shall comply with North American Architectural Woodwork Standards – 3.0 (NAAWS 3.0) Section 01 – Submittals.
 - 1. Shop drawings shall bear the Woodwork Institute Certified Compliance Program Label on the first page. Photocopies of architectural drawings are not acceptable. Highlight any modifications to the Specifications or NAAWS requirements.

1.3 QUALITY ASSURANCE

- A. Materials and fabrication of cabinetwork shall be in accordance with the standards of the NAAWS 3.0 for the grades specified.
- B. Fabricator shall be a Woodwork Institute Accredited Millwork Company in good standing.
- C. WI Certified Compliance Program (CCP):
 - 1. Before delivery to the Project site, provide a Woodwork Institute Certified Compliance Certificate indicating the items to be provided and certifying that they meet the requirements of the Architectural Woodwork Standards and the plans and specifications.
 - 2. Each elevation of casework and plastic laminate countertops shall bear the WI Certified Compliance Label indicating conformance to specified grade.
 - 3. Upon completion of installation, furnish a WI Certified Compliance Certificate for the installation.
 - 4. In the event of question as to compliance with the referenced standard of any item of work, the Architect may require independent inspection service of questioned items as specified in "Independent Inspection Service" of "WI Services and Quality Control Options" published by the WI.
- D. Certified Seismic Installation Program (CSIP):
 - 1. Before walls are closed, furnish a written Woodwork Institute Certified Seismic Installation Program report confirming that backing is provided in all locations required for casework installation or identify those locations where backing is missing or improperly located.

2. On completion of installation, furnish a Woodwork Institute Certified Seismic Installation Program Certificate, identifying the work covered and certifying that installation meets the requirements of the WI CSIP attachment details and schedules.
3. Fees charged by the Woodwork Institute for its Certified Seismic Installation Program are the responsibility of the Contractor and shall be included in the Bid.
4. In the event there is a conflict between the Contract Documents and the CSIP OSHPD-approved OPM and OPA Drawings, the CSIP OSHPD-approved OPM and OPA Drawings and Certified Seismic Installation Program shall prevail.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Check actual dimensions of other construction by accurate field measurements before fabrication and show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
 1. Verify locations of concealed framing, blocking, backing, reinforcements, and other items that support cabinetwork by accurate field measurements before being enclosed and record on shop drawings.
- C. Verify that wall, ceiling and floor surfaces to receive casework are within acceptable tolerances.

1.5 COORDINATION

- A. Cabinets shall be left in a well-ventilated warehouse for a minimum of 72-hours prior to delivery to the Project site.
- B. Cabinets shall be acclimated to the field conditions for a minimum of 72-hours prior to installation.

1.6 INDOOR AIR QUALITY

- A. Do not use wood products containing urea formaldehyde glues inside the shell of the building.
- B. When machining plastic products, protect surrounding areas from dust.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials and fabrication are to meet the requirements of the NAAWS 3.0 for the grade(s) specified.
 1. If there is a conflict between the NAAWS and the drawings and/or specifications, the drawings and specifications shall govern.

2.2 MATERIALS

- A. High-Pressure Decorative Laminate (HPDL): Comply with NAAWS 3.0 Section 04 and NEMA LD3.
 1. Horizontal Surfaces: HGS, 0.048-inch nominal thickness.
 2. Vertical Surfaces: VGS, 0.028-inch nominal thickness.
 3. Cabinet Liner: CLS, 0.020-inch nominal thickness.
 4. Backer: BKL, 0.020-inch nominal thickness.

5. Manufacturer, Pattern, Sheen, Color (P1A): As indicated in the Finish Schedule on the Drawings.
- B. Low-Pressure Decorative Laminate (LPDL): Comply with NAAWS .03 Section 04 and NEMA LD3. LPDL shall consist of melamine, polyester or foil resin-impregnated paper thermally fused under pressure to an approved core and have a balance sheet.
 - C. Balance Sheet:
 1. Plastic Laminate Faced Casework: HPDL or overlay of a compatible thickness.
 - D. Hardboard: Manufactured of interfelted lignocellulosic fibers, consolidated under heat and pressure to a density of 31-pcf or greater, tempered grade, 1/4-inch-thick tempered, smooth both sides.
 - E. Backing for Plastic Laminate: One of the following, at Contractor's option.
 1. Medium Density Fiberboard:
 - a. Cabinets: ANSI 208.2 Grade 130 or better.
 - b. Sink Cabinets and Countertops at Wet Areas: ANSI 208.2, water-resistant Grade MR-50.
 - c. Medium density fiberboard shall contain no added urea formaldehyde resins.
 2. Plywood: NAAWS 03 Grade B close grain hardwood veneer plywood, smooth, well sanded, thickness indicated. Provide exterior grade with waterproof glue at countertops with sinks. Plywood shall contain no added urea formaldehyde resins.
 3. Particleboard:
 - a. Cabinets: ANSI A208.1 Grade M-3 or better.
 - b. Sink Cabinets and Countertops at Wet Areas: ANSI 208.1, water-resistant Grade MR-50.
 - c. Particleboard shall contain no added urea formaldehyde resins.
 - F. Subframe Lumber: No. 1 grade Douglas Fir or plain sawn Yellow Poplar.
 - G. Adhesives: VOC-compliant contact, semi-rigid or rigid adhesives as recommended by laminated plastic manufacturer.
 - H. Hardware: Furnish and install as required to provide a complete casework installation.
 1. General: Hardware shall meet the requirements of the NAAWS 03 for the casework grade specified. Products meeting NAAWS requirements can be found at http://membership.woodworkinstitute.com/cgi-shl/TWServer.exe?Run:PRDACKLST_1
 2. Finish:
 - a. Exposed hardware: To be selected by the Architect.
 - b. Semi-exposed Hardware: Manufacturer's standard finish.
 3. Pulls: To be selected by the Architect.
 4. Drawer Guides: Full extension, meeting the requirements of NAAWS 03 for the type and size of drawer.
 - a. Pencil Drawers: Minimum 50-pound capacity.

- b. General Purpose Drawers: Minimum 100-pound capacity.
 - c. File Drawers: Minimum 150-pound capacity, except for 200-pound capacity for lateral files.
5. Shelf Supports: Bored hole system or recessed metal shelf standard and compatible supports as indicated or as directed by the Architect.
 6. Hinges: 120-degree opening, concealed hinge, passing 100,000-cycle test. Hinges shall be all-metal construction, meeting or exceeding the ANSI/BHMA Grade 1 performance and permanent set test requirements. Provide three hinges on doors over 48-inches high.
 7. Door Locks: Corbin 0737, Olympus 100DR or approved equal. Key as directed by the Owner.
 8. Drawer Locks: Corbin 0738, Olympus 200DW or approved equal. Key as directed by the Owner.
 9. Grommets: Provide at penetrations through countertops. Material, size, finish and color as approved by the Architect. Coordinate location with Owner.

2.3 FABRICATION

- A. Fabricate products in accordance with the approved Shop Drawings and specified NAAWS 03 Grade requirements. The architectural drawings indicate form and profile concept only. Fabrication and construction details shall comply with NAAWS unless otherwise specified.
- B. Fabricate laminated plastic casework in accordance with NAAWS 03 Section 10, Construction Type A – Frameless Construction; Interface Style 1 – Flush Overlay.
 1. Grade: Custom except as otherwise specified.
 2. Exposed exterior portions shall be covered with a HPDL as specified.
 3. Exposed interior surfaces, except at doors and drawer fronts shall be covered with a HPDL matching exposed exterior surfaces.
 4. Exposed interior surfaces of door and drawer fronts shall be covered with the same material, pattern, color and thickness as the door face.
 5. Edge Banding: HPDL or PVC, minimum 0.02-inch thick, color-matched to the exposed face.
 6. Semi-exposed surfaces of cabinet tops and bottoms, cabinet ends, fixed and adjustable shelves, cabinet back, shall be finished with a polyester laminate; exposed edges of semi-exposed surfaces shall be finished with extruded PVC or self-edged plastic laminate.
 7. Door and Drawer Edge: Square edge with thin applied band.
 8. Shelf Thickness: As specified in NAAWS 03 for a uniform load of 50-lb./sq. ft.
 9. Drawer Construction: Dowel or dovetail construction. Sides of 7 or 9 ply hardwood plywood with no voids. Bottoms of hardwood plywood of the same species and cut as the sides
- C. Laminated Plastic Countertops: Fabricate in accordance with North American Architectural Woodwork Standards – 3.0 (NAAWS 03) Section 11, Premium grade.
 1. Countertop Splash Assembly: NAAWS 03 Assembly 2, deck-mount back and end splashes.
 2. Countertop Edges: Self edged with plastic laminate or hardwood trim as indicated.
 3. Back Splash: Horizontal square butt joints or integral cove as indicated.

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4. Top of Back Splash: Square with self-edge.
 5. Back Splash Height: As indicated.
-
- D. Make cuts required to accommodate the work of other Sections in the shop where possible. Review other drawings and work to determine extent of items to be mounted in cabinetwork. Notify the Architect of discrepancies.
 - E. Shop-fabricate cabinets in whole units or partial units practical for handling and transporting. Assemble partial units in place so that each complete unit becomes a unified whole visually and structurally. Fabricate fillers and scribe strips of same materials and finishes as adjacent units.
 - F. Make cuts for hardware and equipment neat and true. Install hardware and fit securely.
 - G. Adjust drawers, doors, and movable shelves to operate easily and smoothly without binding.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cabinetwork in accordance with NAAWS 03 Premium Grade requirements.
- B. Install products plumb and level.
- C. Securely fasten cabinetwork to supporting substrate as indicated.
- D. Fit tight and scribe to walls, ceilings, and other surfaces so no open joints occur.
- E. Remove and replace materials damaged beyond repair or stained beyond cleaning.

3.2 ADJUSTMENT, CLEANING, AND PROTECTION

- A. Repair damaged and defective cabinetwork where possible to eliminate defects; where not possible to properly repair, replace.
- B. Clean, lubricate and make final adjustments to hardware for proper operation.
- C. Clean cabinetwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.
- D. Protect cabinetwork to ensure work will be without damage at time of Substantial Completion. Cover completed cabinetwork with 4-mil polyethylene film protective enclosure, applied in a manner to permit easy removal.

3.3 FIELD QUALITY CONTROL

- A. Furnish Woodwork Institute Certified Seismic Installation Program inspection reports and certification as specified.

END OF SECTION

SECTION 07 13 52

MODIFIED BITUMINOUS SHEET WATERPROOFING

PART 1- GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing modified bituminous sheet waterproofing at below grade walls where indicated.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Cast-in-place concrete is specified in Section 03 30 00.
 - 3. Elastomeric liquid waterproofing is specified in Section 07 14 16.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's recommended installation details, installation, and maintenance procedures.
- C. Applicator's Qualification Letter: Furnish a letter from the manufacturer certifying that the applicator is qualified to install modified bituminous sheet membrane waterproofing and has a minimum of 5 installations of similar scope.
- D. Warranty.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Regularly engaged in the manufacturer of modified bituminous sheet membrane waterproofing for at least 5-years; capable of furnishing a list of five satisfactory installations of the material which have been in service for at least 5-years.
- B. Applicator's Qualifications: Minimum of 5 installations of similar size and complexity to this Project.
- C. Each component of modified bituminous sheet membrane waterproofing system shall comply with applicable Volatile Organic Compound (VOC) regulations.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver materials in unopened containers, clearly marked with manufacturer's name and address and date of manufacture.
- C. Store materials away from sparks or flames, protected from rain and physical damage, and within temperature range recommended by manufacturer.

1.05 PROJECT CONDITIONS

- A. Prior to application, manufacturer's representative, Architect, Contractor, and applicator shall make site inspection to review related conditions affecting performance requirements of the specified system.
- B. Environmental Conditions:
 - 1. The temperature of the air and surfaces to receive waterproofing shall be within the range recommended by the manufacturer.

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2. The concrete surface has cured for a minimum of 7-days and is dry at application.
 3. Provide adequate ventilation during application of material in enclosed areas.
- C. Take precautions and provide protection as required when using products which produce offensive odors and physically irritating pollutants.

1.06 WARRANTY

- A. Furnish a written warranty that the installed systems will be free of defects related to workmanship or material deficiency for a 5-year period from the date of Substantial Completion. The following problems shall be specifically covered under the warranty:
1. Cohesive or adhesive failure of the system.
 2. Weathering deficiencies resulting in failure of the system.
 3. Abrasion or tear failure of the system resulting from normal use.
- B. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. GCP Applied Technologies "Bituthene 4000" or approved equal.

2.02 MATERIALS

- A. Membrane: Cold-applied, self-adhering, preformed membrane, 0.060-inch thick with a 0.004-inch-thick polyethylene film coated on one side with a layer of adhesive-consistency rubberized asphalt.
1. Tensile Strength, Film: 5,000-psi in accordance with ASTM D882.
 2. Tensile Strength, Membrane: 325-psi in accordance with ASTM D412.
 3. Resistance to Hydrostatic Head: 231-feet of water in accordance with ASTM D5385.
 4. Permeance: 0.05-grains/sq. ft./hr./in. Hg in accordance with ASTM E96, Method B.
 5. Water Absorption: 0.1-percent (weight/72-hours) in accordance with ASTM D570.
 6. Pliability, 180-deg. bend over 1-inch mandrel: -45-deg. F. in accordance with ASTM D1970.
- B. Primer: "Bituthene" Adhesive Primer B2 LVC.
- C. Mastic: Rubberized asphalt-based mastic; "Bituthene" Mastic.
- D. Liquid Membrane: Two-component, elastomeric, cold-applied trowel grade urethane material; "Bituthene" Liquid Membrane.
- E. Provide materials recommended by manufacturer and as indicated for detailing corners, joints, drains, and protrusions.
- F. Protection Board: GCP Applied Technologies "Hydroduct 220" or approved equal.
- G. Termination Bar: As recommended by membrane manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

07 13 52 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Concrete surfaces to receive modified bituminous sheet membrane waterproofing shall be free of dirt and debris, void, spalled areas, loose-aggregate, and sharp protrusions, with no coarse aggregate visible. Immediately prior to application, broom clean and blow off all dust.
- B. Concrete masonry to receive modified bituminous sheet membrane waterproofing shall be smooth and free of dirt, oil, and other contaminants.
- B. Pipes, vents, drains, and other penetrations of surface shall be covered to prevent entry of waterproofing material.
- C. Concrete shall have cured for a minimum of 7-days using acceptable curing methods.

3.02 PREPARATION OF SURFACES

- A. Follow recommendations of modified bituminous sheet membrane waterproofing materials manufacturer.
- B. Provide a fillet of liquid membrane at internal corners in accordance with manufacturer's instructions.
- C. Reinforce external corners in accordance with manufacturer's instructions.
- D. Expansion joints shall be sealed and covered in accordance with manufacturer's recommendations.
- E. Mask off adjoining surfaces not to receive waterproofing.

3.03 APPLICATION

- A. Apply materials in accordance with manufacturer's instructions.
- B. Apply primer by brush or roller uniformly to substrate at a rate of 325- to 425-sq. ft. per gallon and allow to dry for a minimum of 60-minutes or until tack-free. If primed areas are not covered on the same day, re-prime if significant dust or dirt accumulate.
- C. Vertical Surfaces:
 - 1. Corners:
 - a. Prepare inside corners by installing a 3/4-inch fillet of liquid membrane and extend 6-inches in each direction from the corner.
 - b. Outside corners shall be free of sharp edges. Prepare outside corners by installing a 12-inch wide strip of waterproofing material centered on the corner. At installer's option, outside corners may be formed by using the alternating lap method with each layer of membrane continuing around the corner a minimum of 6-inches.
 - c. Install membrane over treated inside and outside corners.
 - 2. Membrane:
 - a. Apply membrane vertically in lengths of 7-feet or less. On higher walls, apply two or more lengths of membrane with upper length overlapping lower length by a minimum of 2-1/2-inches. Roll membrane with a hand-roller immediately after application.
 - b. Extend membrane over the top of the foundation wall.
 - c. Terminate membrane with mastic or liquid membrane and termination bar.

- d. At the base of the foundation wall, provide liquid membrane material 6-inches up the wall over vapor retarder termination. Extend, lap membrane over liquid membrane and terminate at base of the foundation wall.
 - e. Seal laps within 12-inches of corners with a troweling of mastic.
 - f. Apply a troweling of mastic or liquid membrane to vertical and horizontal membrane terminations.
- 3. Edges: Seal vertical and horizontal terminations with mastic or liquid membrane material.
 - 4. Seams: Overlap edge and end laps a minimum of 2-1/2-inches. Patch misaligned or inadequately lapped seams with membrane material extending 6-inches beyond the defect and seal edges of patches with a trowel application of mastic or liquid membrane.
 - 5. Protection: Install protection board in accordance with manufacturer's recommendations.

3.04 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.

END OF SECTION

SECTION 07 14 16

ELASTOMERIC LIQUID WATERPROOFING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing cold fluid-applied waterproofing at the following locations:
 - 1. Under thin-set wall tile in wet areas.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Tile is specified in Section 09 30 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's specifications, installation instructions, and general recommendations for each waterproofing material. Include data substantiating compliance with specified requirements.
- C. Warranty.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Documented experience in the installation of waterproofing systems of the type specified, and approved by the manufacturer of the waterproofing materials.
- B. Waterproofing membrane shall meet or exceed extra heavy duty rating when tested in accordance with ASTM C627.
- C. Elastomeric liquid membrane shall be of the same manufacturer as tile setting materials specified in Section 09 30 00.

1.04 JOB CONDITIONS

- A. Substrate: Proceed with waterproofing work only after substrate construction and penetrating work have been completed.
- B. Coordinate finishing and curing of concrete surfaces to receive waterproofing with work of Section 03 30 00. Concrete surfaces shall have a steel trowel finish and shall be covered and wet cured for a minimum of 7-days.
- C. Weather: Proceed with waterproofing work when existing and forecasted conditions will permit work to be performed in accordance with manufacturer's instructions.
- D. Ventilation: Provide adequate ventilation to prevent accumulations of hazardous fumes during application of solvent-based components in enclosed spaces, and maintain ventilation until coatings have cured.

1.05 WARRANTY

- A. Warrant elastomeric liquid waterproofing to be free from defects in materials and workmanship for a period of 25-years from Date of Substantial Completion. This warranty shall include the cost to replace covering materials applied over cold fluid-applied waterproofing. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

07 14 16 ELATOMERIC LIQUID WATERPROOFING

2.01 APPROVED MANUFACTURERS

- A. Laticrete International "Hydroban", Parex USA / Merkete "Hydro Guard SP1 Waterproof Membrane and Anti-Fracture Membrane" or approved equal.

2.02 MATERIALS

- A. Membrane: Cold-applied liquid rubber latex with fabric reinforcement.
- B. Reinforcing: Rot-proof fabric, designed by membrane manufacturer for use in reinforcing membrane.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean substrate of projections and substances detrimental to work; comply with recommendations of membrane manufacturer.
- B. Rough or uneven surfaces shall be made smooth or leveled with underlayment material in accordance with manufacturer's recommendations.
- C. Concrete surfaces shall be smooth, clean, free from dirt, grease, concrete sealers or curing compounds.
- D. Dry, dusty slabs shall be dampened and swept off.
- E. Do not allow waterproofing materials to enter and clog drains and conductors. Prevent spillage and migration onto other surfaces of work, by masking.

3.02 INSTALLATION

- A. Comply with ANSI A108.1, ANSI A108.13 and manufacturer's instructions.
- B. Precut reinforcing fabric allowing 2-inches for overlap at ends and sides. Extend fabric 6-inches through door openings.
- C. Reinforce Joints: Spread a layer of waterproofing liquid at joints and cracks. Imbed a 6-inch wide strip of reinforcing fabric into the liquid. Spread a layer of waterproofing liquid over the fabric to seal it.
- D. Coves: Spread a layer of waterproofing liquid in coves, imbed fabric and allow 6-inches of the fabric to flash up to walls. Spread a coat of liquid over the fabric to seal it. Flash the fabric and waterproofing liquid into drains and around projections.
- E. Cracks: Clean and fill cracks greater than 1/16-inch with a scratch coat of latex portland cement mortar and allow to cure. Spread a layer of waterproofing liquid on crack, embed a 6-inch strip of reinforcing fabric into the liquid, and spread a coat of liquid over the fabric to seal it.
- F. Using a paint roller or brush, apply a coat of liquid membrane to the floor and/or wall, slightly wider than the fabric width. Include joints and coves previously reinforced. While the surface is still wet, embed fabric and smooth out wrinkles and press with brush or roller until membrane bleeds through to surface..
- G. Apply liquid membrane to completely cover the fabric and allow to dry to the touch.
- H. Apply an additional coat of liquid membrane and allow to dry.
- I. Inspect final surface for pinholes, voids or thin spots. Use additional membrane liquid to seal any defects.

3.03 PROTECTION

- A. Do not permit traffic on completed membrane prior to application of surfacing material.

3.04 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing the following:
 - 1. Thermal batt/blanket insulation.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Roof board insulation is specified in Section 07 22 16.
 - 3. Firestopping insulation is specified in Section 07 84 00.
 - 4. Acoustic insulation is specified in Section 09 81 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's specifications for each type of insulation required.

1.03 QUALITY ASSURANCE

- A. Thermal Conductivity: Where insulation is indicated or specified by "R" value, provide thickness required to achieve indicated value. Use aged and settled values for thermal resistance factors (R-values), tested in accordance with ASTM C518 at 75-deg. F. and 50-percent relative humidity for at least 6-months.
- B. Fire Ratings: Comply with fire-resistance and flammability ratings specified.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Protect insulation from physical damage and from becoming wet or soiled. Comply with manufacturer's recommendations for handling, storage and protection during installation.

1.05 TESTING AND INSPECTIONS

- A. Inspect insulation for proper installation. Correct defects such as voids, gaps or insulation compressed behind pipes before accepting work.

1.06 INDOOR AIR QUALITY

- A. Protect ducts and HVAC system from loose insulation particulates.
- B. Provide temporary ventilation of building areas where building insulation is being installed.

PART 2 – PRODUCTS

2.01 BATT AND BLANKET INSULATION

- A. Un-faced Formaldehyde-Free Thermal Batt/Blanket Insulation:
1. Approved Manufacturers: Johns Manville “Formaldehyde-free Unfaced” or approved equal.
 2. Material: Thermal fiberglass insulation made from resilient glass fibers bonded with a formaldehyde-free acrylic thermosetting binder, complying with ASTM C665, Type I.
 3. Surface Burning Characteristics: Flame spread 25 or less; smoke developed 50 or less, when tested in accordance with ASTM E84.
 4. Thickness: As required for indicated R-values. Size batts to fill framing cavity.
- B. Mineral Fiber Insulation:
1. Approved Manufacturers: Thermafiber “Thermafiber Curtain Wall CW-90 Insulation, Fibrex Insulations Inc. “Fibrex Curtain Wall (CW) Insulation” or approved equal.
 2. Material: Mineral-wool-type insulation, non-combustible when tested in accordance with ASTM E136, moisture-resistant, non-corrosive, non-deteriorating, mildew-proof and vermin-proof, complying with ASTM C665, Type I and II, Class A, Category 1.
 3. Surface Burning Characteristics: Flam spread 0, smoke developed 0, when tested in accordance with ASTM E84.
 4. Density: 8.0-pcf unless otherwise recommended by manufacturer for installation conditions.
 5. Thickness: As indicated.

2.02 RIGID BOARD INSULATION

- A. Extruded Polystyrene Board Insulation: Extruded polystyrene board insulation complying with ASTM C578, Type V.
1. Approved Manufacturers: Dow “Styrofoam Brand High Load”, Owens Corning “Foamular 1000” or approved equal.
 2. Compressive Strength, ASTM D1621: 100-psi.
 3. Flexural Strength, ASTM C203: 100-psi.
 4. Water Absorption, ASTM C272: 0.1-percent by volume.
 5. Water Vapor Permeance, ASTM E96: 0.8-perms.
 6. Dimensional Stability, ASTM D2126: 3.5-percent linear change.
 7. Thickness: As indicated or required for indicated R-values.

8. Surface Burning Characteristics: Maximum flame-spread and smoke development values of 5 and 165 when tested in accordance with ASTM E84.
- B. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam core bonded on each side to a trillaminate foil facer, complying with ASTM C1289, Type I, Class 1.
1. Approved Manufacturers: Johns Manville “AP Foil-Faced” or approved equal.
 2. Compressive Strength, ASTM D1621: 20-psi.
 3. Dimensional Stability, ASTM D2126: 2-percent max., 7-days.
 4. Moisture Vapor Transmission, ASTM E96: < 1 perm.
 5. Water Absorption, ASTM C209: < 1-percent by volume.
 6. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 75 and 200 when tested in accordance with ASTM E84.
 7. Thickness: As indicated or required for indicated R-values.
- C. Continuous Exterior Insulation:
1. Approved Manufacturer: Roxul, Inc. “Comfortboard CIS” or approved equal.
 2. Material: Rigid, high-density, non-combustible, stone wool insulation board.
 3. Thermal Resistance, ASTM C518: R-value of 4.0/inch at 75-deg. F.
 4. Compressive Strength, ASTM C165: 1,220-psf @ 10-percent; 1,880-psf @ 25-percent.
 5. Moisture Resistance:
 - a. Moisture Sorption, ASTM C1104: 0.28-percent.
 - b. Water Vapor Transssmission, Desiccant Method, ASTM E96: 35 perms.
 - c. Water Absorption, ASTM C209: 1.2-percent.
 6. Fire Resistance:
 - a. Non-combustible, able to withstand temperatures up to 2,150-deg. F.; does not produce smoke or propagate flames.
 - b. Flame Spread 0 / Smoke Developed 0, ASTM E84 (UL 723).
 7. Corrosive Resistance, ASTM C665: Non-corrosive to steel or aluminum.
 8. Fungi Resistance, ASTM C1338: Passed.

9. Thickness: As indicated.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's instructions for installation conditions.
- B. Do not install insulation until building is sufficiently enclosed or protected against absorption of moisture by the insulation, and do not install insulation unless supporting framing and construction is in a thoroughly dry condition.
- C. Install snugly between framing members with ends snugly fitted between units and against adjacent construction.
- D. Carefully cut and fit insulation around pipes, conduit, and other obstructions and penetrations.
- E. Where door, window and skylight frames occur in framing, cut additional strips of insulation and hand-pack as required to fill voids in and around such frames.
- F. Use insulation free of ripped backs and edges.

3.02 PROTECTION

- A. Protect installed insulation and vapor barriers from harmful exposures and from physical damage.

3.03 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Plan and coordinate the insulation work to minimize the generation of offcuts and waste. Remove insulation scraps to the maximum extent feasible.
- C. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

ROOF BOARD INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing roof board insulation.
- B. Related Sections:
 - 1. Thermal insulation is specified in Section 07 21 00.
 - 2. Firestopping insulation is specified in Section 07 84 00.
 - 3. Acoustic insulation is specified in Section 09 81 00.

1.2 SUBMITTALS

- A. General: Comply with the requirements in Division 01.
- B. Shop Drawings: Show layout and identification of tapered roof insulation pieces. Coordinate with architectural roof plans and roof details.
- C. Certification from roofing system manufacturer that insulation proposed for use is acceptable for application of roofing.

1.3 QUALITY ASSURANCE

- A. Labels and Approvals: Roof insulation shall be listed by UL for use with UL Class A roof covering systems and bear the UL label or be delivered with a UL certification of compliance.
- B. Roof insulation shall comply with EPA Energy Star – Program Requirements for Roof Products.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with the requirements in Division 01.
- B. 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.

PART 2 - PRODUCTS

2.1 ROOF INSULATION AT BUILT-UP ASPHALT ROOFING

- A. Polyisocyanurate Board Roof Insulation: HCFC-free rigid closed-cell, non-composite, polyisocyanurate board insulation integrally laminated to heavy non-asphaltic fiber-reinforced felt facers conforming to ASTM C1289, Type II, Class 1.
 - 1. Approved Manufacturers: Johns Manville "ENRGY 3" or approved equal.
 - 2. Compressive Strength: Minimum 25-psi.
 - 3. Blowing Agent: HCFC free hydrocarbon.
 - 4. Fire-Ratings: ASTM E108 Class A; ASTM E119 non-combustible.
 - 5. Provide tapered units where required for slope to drain. Minimum thickness at tapered boards shall be 1/2-inch. Minimum slope to drains shall be 1/4-inch per foot.
 - 6. Provide in multiple layers. Minimum thickness of first layer shall be 1-inch or as recommended by roof insulation manufacturer for spanning metal deck flutes.

- B. Cover Board: Johns Manville “Invinso Roof Board” or approved equal, high-density polyisocyanurate bonded in-line to mineral-surfaced, fiber glass reinforced facers.

2.2 INSULATION FASTENERS

- A. Mechanical Fasteners: As recommended by roof insulation manufacturer for securing roof insulation to roof substrate and as required for Factory Mutual wind uplift resistance rating of I-60.
- B. Asphalt Adhesive: Steep asphalt, as recommended by roof insulation manufacturer.

PART 3 - EXECUTION

3.1 ROOF BOARD INSTALLATION

- A. Coordinate installation of roof system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Install roof insulation in conformance with manufacturer’s printed instructions.
- C. Install and secure preformed cant strips at junctures of roofing with vertical surfaces or angle changes greater than 45-degrees.
- D. Install tapered insulation where required to conform to roof slopes indicated.
- E. Install insulation with long joints 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.
- F. Install one or more layers of insulation to achieve required thickness. Where overall insulation thickness is 1-1/2-inches or greater, install 2 or more layers with joints of each layer staggered from joints of previous layer a minimum of 6-inches in each direction.
- G. Trim surface of insulation where required at roof drains so completed surfaces is flush and does not restrict water flow.
- H. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- I. Mechanically Fastened Insulation: Secure uppermost layer of insulation to deck using mechanical fasteners design and sized for fastening roof insulation to deck type. Loose lay all other layers below with staggered joints.
 - 1. Fasten according to requirements in FMG’s “Approval Guide” for specified Windstorm Resistance Classification.
 - 2. Install subsequent layers in a cold fluid-applied adhesive in accordance with manufacturer’s instructions.

3.2 COVER BOARD INSTALLATION

- A. Coordinate installation of roof system components so cover board is not exposed to precipitation or left exposed at the end of the workday.
- B. Install cover board in conformance with manufacturer’s printed instructions.
- C. Install cover board with long joints in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4-inch with cover board.
 - 1. Cut and fit cover board within 1/4-inch of nailers, projections, and penetrations.

- D. Trim surface of cover board where required at roof drains so completed surface is flush and does not restrict water flow. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- E. Adhered Cover Board: Adhere cover board to roof insulation. Set in a two-part cold fluid-applied adhesive in accordance with manufacturer's instructions.

3.3 CLEANUP

- A. Remove debris resulting from work under this Section from roof surfaces and Project site,
- B. Leave surfaces in a condition acceptable to roof membrane installer.

END OF SECTION

SECTION 07 25 00

WEATHER BARRIER

PART 1 - GENERAL

1. SECTION INCLUDES

- a. Weather barrier membrane (DuPont™ Tyvek® ThermaWrap™)
- b. Seam Tape (DuPont™ Tyvek® Metallized Tape or DuPont™ Tyvek® Tape)
- c. Flashing (DuPont™ FlexWrap™ DuPont™ FlexWrap™NF, DuPont™ StraightFlash™, DuPont™ StraightFlash™ VF, and/or DuPont™ Thru-Wall Flashing).
- d. Fasteners

2. REFERENCES

- a. ASTM International
 - i. ASTM C 920; Standard Specification for Elastomeric Joint Sealants
 - ii. ASTM C 1193; Standard Guide for Use of Joint Sealants
 - iii. ASTM D 882; Test Method for Tensile Properties of Thin Plastic Sheeting
 - iv. ASTM D 1117; Standard Guide for Evaluating Non-woven Fabrics
 - v. ASTM E 84; Test Method for Surface Burning Characteristics of Building Materials
 - vi. ASTM E 96; Test Method for Water Vapor Transmission of Materials
 - vii. ASTM E 2178; Test Method for Air Permeance of Building Materials
- b. AATCC – American Association of Textile Chemists & Colorists
 - i. Test Method 127 Water Resistance: Hydrostatic Pressure Test
- c. TAPPI
 - i. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
 - ii. Test Method T-460; Air Resistance of Paper (Gurley Hill Method)

3. SUBMITTALS

- a. Refer to Section 01 33 00 Submittal Requirements .
- b. Product Data: Submit manufacturer current technical literature for each component.
- c. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.

- d. Quality Assurance Submittals
 - i. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
 - ii. Manufacturer Instructions: Provide manufacturer's written installation instructions.
 - iii. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.
- e. Closeout Submittals
 - i. Refer to Section 01 77 00 Closeout Procedures.
 - ii. Weather Barrier Manufacturer's Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of weather barrier purchase.

4. QUALITY ASSURANCE

- a. Qualifications
 - i. Installer shall have experience with installation of DuPont™ Tyvek® weather barrier assemblies under similar conditions.
 - ii. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
 - iii. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.
- b. Mock-up
 - i. Install mock-up using approved weather barrier assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations.
 - 1. Mock-up size 10 feet by 10 feet.
 - 2. Mock-up Substrate: Match wall assembly construction, including window opening.
 - 3. Mock-up may remain as part of the work.
 - ii. Contact manufacturer's designated representative prior to weather barrier assembly installation, to perform required mock-up visual inspection and analysis as required for warranty.
- c. Pre-installation Meeting
 - i. Refer to Section 01 31 19 Project Meetings.

(Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, installer, Owner's Representative, and weather barrier manufacturer's designated representative.

- ii. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

5. DELIVERY, STORAGE AND HANDLING

- a. Refer to Section 01 66 00 Product Delivery.
- b. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- c. Store weather barrier materials as recommended by weather barrier manufacturer.

6. SCHEDULING

- B. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.
- C. Schedule installation of weather barrier materials and exterior cladding within four months of weather barrier assembly installation.

7. WARRANTY

- a. Refer to Section 01 78 36 Warranties.

Special Manufacturer's Warranty

- i. Weather barrier manufacturer's warranty for weather barrier for a period of ten years from date of weather barrier purchase.
- ii. Pre-installation meetings and jobsite observations by weather barrier manufacturer for warranty are required prior to assembly installation.
- iii. For warranty details review Manufacturer's published warranty. The foregoing is merely a brief summary of the warranty and Manufacturer's obligations are limited to those set out in the warranty document.

PART 2 - PRODUCTS

1. MANUFACTURER

- b. DuPont; 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805; 1-800-44-TYVEK (8-9835); <http://www.construction.tyvek.com>

2. MATERIALS

- a. Basis of Design: spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont™ Tyvek® ThermaWrap™ and related assembly components.
- b. Performance Characteristics (Values listed are nominal values measured by an accredited third party lab.):
 - i. Effective R-value: R-2 (including ¾" minimum airspace), as designated on ASHRAE tables, ASTM Handbook of Fundamentals, Chapter 25- Table 3.
 - ii. Air Penetration: 0.002 cfm/ft² at 1.57 psf, when tested in accordance with ASTM E 2178.
 - iii. Water Vapor Transmission: 68 perms, when tested in accordance with ASTM E 96, Method B.
 - iv. Water Penetration Resistance: 210 cm when tested in accordance with AATCC Test Method 127.
 - v. Basis Weight: 2.5 oz/yd², when tested in accordance with TAPPI Test Method T-410.
 - vi. Air Resistance: Air infiltration at >1000 seconds, when tested in accordance with TAPPI Test Method T-460.
 - vii. Tensile Strength: 29/27 lbs/in., when tested in accordance with ASTM D 882, Method A.
 - viii. Tear Resistance: 12/7 lbs., when tested in accordance with ASTM D 1117.
 - ix. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84. Flame Spread: 10, Smoke Developed: 40.

3. ACCESSORIES

Seam Tape: DuPont™ Tyvek® Metallized Tape or DuPont™ Tyvek® Tape as distributed by DuPont.

- a. Fasteners:
 - i. Tyvek® Wrap Caps, as distributed by DuPont: #4 nails with large 1-inch plastic cap fasteners or 1-inch cap staples.
 - ii. Masonry tap-con fasteners with Tyvek® Wrap Caps as distributed by DuPont: 2-inch diameter plastic cap fasteners.
- b. Sealants
 - i. Refer to Section 07 92 00 Joint Sealers.
 - ii. Products:
 1. DuPont™ Commercial Sealant
 2. Sealants recommended by the weather barrier manufacturer.
- c. Adhesives:
 - i. Provide adhesive recommended by weather barrier manufacturer.

Products:

1. Liquid Nails® LN-109

2. Denso Butyl Liquid
 3. 3M High Strength 90
 4. SIA 655
 5. Adhesives recommend by the weather barrier manufacturer.
- d. Primers:
- i. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
 - ii. Products:
 1. 3M High Strength 90
 2. Denso Butyl Spray
 3. SIA 655
 4. Permagrip 105
 5. Primers recommended by the flashing manufacturer
- e. Flashing
- i. DuPont™ FlexWrap™, as distributed by DuPont: flexible membrane flashing materials for window openings and penetrations.
 1. DuPont™ FlexWrap™ NF, as distributed by DuPont: flexible membrane flashing materials for window openings and penetrations.
 3. DuPont™ StraightFlash™, as distributed by DuPont: straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc.
 4. DuPont™ StraightFlash™ VF, as distributed by DuPont: dual-sided straight flashing membrane materials for brick mold and non-flanged windows and doors.
 5. DuPont™ Thru-Wall Surface Adhered Membrane with Integrated Drip Edge: Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials.
 6. Preformed Inside and Outside Corners and End Dams as distributed by DuPont: Preformed three-dimensional shapes to complete the flashing system used in conjunction with DuPont™ Thru-Wall Flashing.

PART 3 - EXECUTION

1. EXAMINATION

- f. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

2. INSTALLATION - WEATHER BARRIER

- g. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations

- h. Install weather barrier prior to installation of windows and doors.
- i. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
- j. Install weather barrier silver side facing air space.
- k. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level
- l. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
- m. Window and Door Openings: Extend weather barrier completely over openings.
- n. Overlap weather barrier
 - i. Exterior corners: minimum 12 inches.
 - ii. Seams: minimum 6 inches.
- o. Weather Barrier Attachment:
 - i. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
 - ii. Attach weather barrier to masonry. Secure using weather barrier manufacturer recommend fasteners, space 6-18 inches vertically on center and 24 inches maximum horizontally. Weather barrier may be temporarily attached to masonry using recommended adhesive, placed in vertical strips spaced 24 inches on center, when coordinated on the project site.

Apply 4 inch by 7 inch piece of DuPont™ StraightFlash™ or weather barrier manufacturer approved alternate to weather barrier membrane prior to the installation cladding anchors.

3. SEAMING

- p. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- q. Seal any tears or cuts as recommended by weather barrier manufacturer.

4. OPENING PREPARATION

- a. Cut weather barrier in an “I-cut” pattern. A modified “I-cut” is also acceptable.
 - i. Cut weather barrier horizontally along the bottom and top of window opening.
 - ii. From top center of the window opening, cut weather barrier vertically down to sill.
 - iii. Fold side and bottom weather barrier flaps into window opening and fasten.

- b. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

5. FLASHING

- a. Cut 9 inch wide DuPont™ FlexWrap™NF or DuPont™ FlexWrap™ NF a minimum of 12 inches longer than width of sill rough opening.
- b. Cover horizontal sill by aligning DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
- c. Fan DuPont™ FlexWrap™ or DuPont™ FlexWrap™ NF at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges. Mechanical fastening of DuPont™ FlexWrap™ NF is not required.
- d. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.
- e. Install window according to manufacturer's instructions.
- f. Apply 4-inch wide strips of DuPont™ StraightFlash™ at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.
- g. Apply 4-inch wide strip of DuPont™ StraightFlash™ as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
- h. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.
- i. Tape head flap in accordance with manufacturer recommendations
- j. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

6. FIELD QUALITY CONTROL

- k. Notify manufacturer's designated representative to obtain periodic observations of weather barrier assembly installation.

7. PROTECTION

Protect installed weather barrier from damage.

END OF SECTION

SECTION 07 27 00

FLUID-APPLIED WEATHER-RESISTIVE AIR AND MOISTURE BARRIER MEMBRANE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section includes liquid-applied 100-percent silicone vapor permeable air and water-resistive barrier system under exterior cladding materials.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Gypsum sheathing is specified in Section 06 16 43.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Submit manufacturer-s product data including membrane and accessory material types, technical and test data, composition, descriptions and properties, installation instructions and substrate preparation requirements.
- C. Test Reports: Submit test reports indicating compliance with specified performance characteristics and requirements.
- D. VOC Certification: Certification that products furnished comply with regulations controlling use of VOCs.
- E. Shop Drawings: Indicate locations and extent of weather and air barrier system.
 - 1. Include details of conditions specific to this project, including joints, cracks, intersections with other building envelope systems and materials, corners, terminations, counterflashings and details showing bridging of envelope at substrate changes.
 - 2. Include details of sealing penetrations, and detailed flashing around windows and doors.
- F. Warranty.
- G. Qualifications: Submit letters of verification that manufacturer and installer meet qualifications as specified.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Weather and air barrier systems shall be manufactured and marketed by a firm with minimum of 5-years' experience in the production and sales of weather and air barrier system. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified and include a list of projects of similar design and complexity completed within the past five years.

07 27 00 FLUID-APPLIED WEATHER-RESISTIVE AIR AND MOISTURE BARRIER MEMBRANE

- B. **Installer's Qualifications:** The installer shall demonstrate qualifications to perform the work of this Section by submitting the following:
1. Verification that installer has been trained by and is approved to perform work as herein specified by weather and air barrier system manufacturer.
 2. List of at least three projects completed within the past 3-years of similar scope and complexity to this project carried out by the firm and site supervisor.
 3. Evidence of proper equipment and trained field personnel to successfully complete the project.
- C. **Inspection and Testing:** Cooperate and coordinate with the Owner-s inspection and testing agency. Do not cover installed products or assemblies until they have been inspected, tested and approved.
- D. **Sole Source:** Obtain materials from a single manufacturer.
- E. **Regulations:** Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOC's).
- F. **Pre-installation Conference:** Prior to beginning installation of weather and air barrier system, hold a pre-installation conference to review work to be accomplished.
1. Contractor, Architect, installing subcontractor, membrane system manufacturer's representative, and all subcontractors who have materials penetrating membrane system or finishes covering membrane system shall be present.
 2. Notify Architect at least seven days prior to time for conference.
 3. Record minutes of meeting and distribute to attending parties.
 4. Agenda: As a minimum discuss:
 - a. Surface preparation.
 - b. Substrate condition and pretreatment.
 - c. Minimum curing period.
 - d. Special details and sheet flashing.
 - e. Sequence of construction, responsibilities, and schedule for subsequent operations.
 - f. Installation procedures.
 - g. Testing and inspection procedures.
 - h. Protection and repair procedures.
 - i. Review and approval of glazing applications.

1.04 MOCK-UP

**07 27 00 FLUID-APPLIED WEATHER-RESISTIVE
AIR AND MOISTURE BARRIER MEMBRANE**

- A. Prior to installation of the weather and air barrier system a field-constructed mock-up shall be applied to verify details and tie-ins, to demonstrate the required quality of materials and installation.
 - 1. Construct a typical exterior wall section, 8-feet long and 8-feet wide, incorporating back-up wall, cladding, window, door frame, sill, penetrations, insulation, flashing and any other critical junction.
 - 2. Allow 72-hours for inspection and testing of mock-up before proceeding with weather and air barrier work.
 - 3. Approved, undamaged mock-up may remain as part of the work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage, weather, excessive temperatures and construction operations. Remove damaged material from site and dispose of in accord with applicable regulations.
- C. Protect weather and air barrier components from freezing and extreme heat. Store materials at temperatures of 40- to 100-deg. F.
- D. Sequence deliveries to avoid delays, and to minimize on-site storage.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content and other conditions affecting performance.
- B. Weather Conditions: Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used.
 - 1. Do not apply to frozen substrate.
 - 2. Do not apply at surface temperatures below 40 degrees F. or over 150 degrees F. on the substrate.
 - 3. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive the membrane system.
 - 4. Exposure Limitations: Schedule work to ensure that weather and air barrier system is covered and protected from UV exposure within 180 days of installation. If weather and air barrier membrane system cannot be covered within 180 days after installation, apply temporary UV protection as recommended by membrane manufacturer.
- C. Proceed with installation only when the substrate construction and preparation work are complete and in condition to receive the membrane system.

1.07 WARRANTY

07 27 00 FLUID-APPLIED WEATHER-RESISTIVE AIR AND MOISTURE BARRIER MEMBRANE

- A. Warranty: Warrant installed weather and air barrier materials are watertight, free from defects in material and workmanship for a period of 10-years from date of Substantial Completion. This warranty is in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURER

- A. Momentive Performance Materials, Inc. "GE Elemax 2600" or approved equal.

2.02 MATERIALS

- A. Liquid Flashing: GE Elemax 5000 Liquid Flashing, GE SCS2000 SilPruf, GE SCS2700 SilPruf LM, GE SCS9000 SilPruf NB or GE SWS.
- B. Reinforcing Fabric: RF100, widths as appropriate.
- C. Sheet Flashing: GE Elemax SS Flashing, widths as appropriate.
- D. Silicone Transition Membrane: GE UST2200 UltraSpan, widths as appropriate.
- E. Pre-cured Silicone Molded Corners: GE USM UltraSpan inside and outside corners.

2.03 PERFORMANCE REQUIREMENTS

- A. UV Exposure: No limit.
- B. Application Temperature: 0-deg. F. to 158-deg. F.
- C. Performance Properties:

Property	Value	Test Method
Required Dry Film Thickness	17 mils dry	Apply 19 mils wet
Air Permeance – tested at 1.57 psf	0.00004 cfm/sq. ft.	ASTM E2178
Assembly Air Leakage – tested at 1.57 psf	0.0002 cfm/sq. ft.	ASTM E2357
Water Resistance	Pass	AATCC-127
Water Penetration	No water penetration observed after 15 min. @ 62.5 psf	ASTM E331
Water Vapor Permeance at 17 mils DFT	10.5 perms @ 17 mils DFT	ASTM E96
UV & Weathering Resistance	No degradation after 5000 hours	ASTM G154
Self Sealability around Nails	Pass @ 17 mils DFT	ASTM D1970
Crack Bridging Ability (1/16" or 1.5 mm)	Pass	ASTM C1305
Mildew Resistance	0 – No Growth	ASTM D5590
Pull off Strength (concrete)	126 psi	ASTM D4541
Pull off Strength (fiberglass mat faced gypsum sheathing)	44 psi	ASTM D4541
Tensile Strength	175 psi	ASTM D412
Elongation	542%	ASTM D412
Multi-Story Wall Assembly Burn	Passed in assembly tested and	NFPA 285

07 27 00 FLUID-APPLIED WEATHER-RESISTIVE AIR AND MOISTURE BARRIER MEMBRANE

Test	acceptable for use in various wall assemblies	
Surface Burning	Flame Spread: 0 Smoke Developed: 185 NFPA Class A, UBC Class 1	ASTM E84

PART 3 - EXECUTION

3.01 SUBSTRATE PREPARATION

- A. Examine conditions for compliance with system manufacture-s requirements for installation, tolerances and other specific conditions affecting performance of weather and air barrier system.
- B. Surfaces shall be sound, clean and free of grease, dirt, excess mortar or other contaminants. Fill or bridge damaged surfaces, voids or gaps larger than 1-inch. Fill voids and gaps measuring 1-inch or less with liquid applied fill coat and seam filler.
- C. Treat joints ranging from 1/4- to 1/2-inch with backer rod before applying liquid flashing.
- D. Surfaces to receive fluid-applied air and water barrier shall be dry or damp. Surfaces to receive STPE fluid-applied accessories shall be dry, damp or wet to the touch. Brush away any standing water before application.
- E. Spot all over and under drive fasteners with GE liquid flashing or GE Elemax 2600.

3.02 INSTALLATION

- A. Transition/Detailing Treatment: Install appropriate materials to treat sheathing joints, expansion joints, drift joints, rough openings, transitions, terminations, penetrations, and similar surface irregularities. Transitions and detailing can be performed before or after air barrier membrane application. Ensure installation is performed in accordance with manufacturer's written installation instructions and details.
 - 1. Sheathing joints <1/2-inch may be treated with any of the following methods:
 - a. GE liquid flashing installed in accordance with manufacturer's installation details.
 - b. 4-inch GE RF100 properly embedded in GE Elemax 2600 and centered on joint.
 - 2. Inside or outside corners. Ensure liquid flashing or reinforcement extends a minimum 3-inches onto each angle change. Any of the following methods may be utilized:
 - a. GE liquid flashing installed in accordance with manufacturer's installation details.
 - b. 6-inch GE RF100 embedded in GE Elemax 2600 and centered on corner.
 - c. 6-inch GE Elemax SS Flashing centered on corner.
 - d. GE UST2200 UltraSpan set in GE liquid flashing and centered on corner.

07 27 00 FLUID-APPLIED WEATHER-RESISTIVE AIR AND MOISTURE BARRIER MEMBRANE

3. Rough Openings: Ensure liquid flashing or reinforcement extends a minimum 3-inches onto vertical wall and into rough opening. Any of the following methods may be utilized:
 - a. GE liquid flashing installed in accordance with manufacturer's installation details.
 - b. Minimum 6-inch GE RF100 embedded in GE Elemax 2600.
 - c. Minimum 6-inch GE Elemax SS Flashing installed in accordance with manufacturer's installation details.
 - d. Minimum 6-inch GE UST2200 UltraSpan set in GE liquid flashing.
 - e. GE USM UltraSpan outside corners may be utilized in combination with any of the above methods.
 4. Pipe or duct penetrations may be treated with any of the following methods:
 - a. GE liquid flashing installed around entire perimeter and properly tooled.
 - b. GE RF100 embedded in GE Elemax 2600. Ensure GE RF100 extends a minimum 2-inches onto wall.
 5. Static joints >1/2-inch, expansion joints and drift joints may be treated with any of the following methods:
 - a. Minimum 6-inch GE UST2200 UltraSpan set in GE liquid flashing or GE Elemax 2600 and centered on joint. Ensure GE UST2200 UltraSpan extends a minimum 1-inch onto wall.
 6. Transitions may be treated with any of the following methods:
 - a. GE liquid flashing installed in accordance with manufacturer's installation details.
 - b. GE RF100 embedded in GE Elemax 2600.
 - c. GE Elemax SS Flashing installed in accordance with manufacturer's installation details.
 - d. GE UST2200 UltraSpan set in GE liquid flashing.
 7. Through Wall Flashing: GE Elemax SS Flashing installed in accordance with manufacturer's installation details.
- B. Fluid-Applied Air and Moisture Barrier:
1. Apply by spraying, power roller, roller and/or brush.
 2. Apply at a rate of approximately 80-sq. ft. per gal in a single coat application. A wet applied 19 wet mil thickness will yield a 17 mil dry film thickness.
 3. Apply the coating to ensure a uniform and seamless application.

**07 27 00 FLUID-APPLIED WEATHER-RESISTIVE
AIR AND MOISTURE BARRIER MEMBRANE**

4. Touch up or repair damage using spray, power roller, roller or brush.

3.03 CLEANING AND PROTECTION

- A. Protect air and moisture barrier system from damage during application and remainder of construction period.
- B. If damage occurs, repair in accordance with manufacturer's installation details.
- C. Clean spills, stains and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer.
- D. Remove masking materials after installation.

3.04 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13 for removal and disposal of construction debris and waste.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing flashing and sheet metal.
 - 1. Provide all sheet metal flashing and trim required to provide a weathertight enclosure.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Formed metal fabrications are specified in Section 05 58 00.
 - 3. Self-adhering sheet flashing is specified in Section 07 65 26.

1.02 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. Completed sheet metal flashing and trim shall not rattle, leak, or loosen and shall remain watertight.
- B. Fabricate and install roof edge flashing and copings capable of resisting forces required by the California Building Code (CBC) according to recommendations in FMG Loss Prevention Data Sheet 1-49.
- C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes of 120-deg. F. ambient and 180-deg. F. material surfaces.

1.03 SUBMITTAL

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's product data, installation instructions and general recommendations for each specified sheet material and fabricated product. Include construction details, material descriptions, dimension of components and profiles, and finishes for each manufactured product or accessory.
- C. Samples: 8-inch square samples of specified sheet materials to be exposed as finished surfaces.
- D. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, and details. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identification of material, thickness, weight, and finish for each item and location.
 - 2. Details of forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips and other attachments. Include pattern of seams.
 - 4. Details of termination points and assemblies, including fixed points.
 - 5. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashing, as applicable.

- 6. Details of special conditions.
- 7. Details of connections to adjoining work.
- E. Warranty.

1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that 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.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA "Architectural Sheet Metal Manual" unless more stringent requirements are indicated or specified.
- C. Pre-installation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer, installer and installer whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, skylights, and roof-mounted equipment.
 - 2. Review methods and procedures related to sheet metal flashing and trim.
 - 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing and trim.
 - 5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.05 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. 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.
- C. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent required for the period of sheet metal flashing and trim installation.

1.06 WARRANTY

- A. Special Warranty on Finishes: Warrant factory-applied finish that shows evidence of deterioration within 20-years from date of Substantial Completion. Deterioration includes, but is not limited to, the following:
 - 1. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - 2. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - 3. Cracking, checking, peeling, or failure paint to adhere to bare metal.
- B. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

- B. Sheet Metal Thickness: The following table may be used to convert specified sheet metal thickness to gauges.

Gauge No.	Aluminum	Stainless steel	Zinc-Tin Coated Stainless Steel	Galvanized	Aluminum-Zinc Coated Steel	Zinc
12	---	---	---	---	---	.028"
13	---	---	---	---	---	.032"
14	---	---	---	---	---	.036"
15	---	---	---	---	---	.040"
16	.063"	.063"	---	.064"	.064"	.045"
18	.050"	.050"	---	.052"	.052"	.055"
20	.040"	.038"	---	.040"	.040"	.070"
22	.034"	.031"	---	.034"	.034"	.090"
23	.032"	.028"	---	.031"	.031"	.100"
24	.028"	.025"	---	.028"	.028"	.125"
25	.024"	.022"	.024"	.025"	.025"	---
26	.022"	.019"	.018"	.022"	.022"	---
28	---	.016"	.015"	.019"	.019"	---

- C. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755.
1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653, G90 coating designation; structural quality.
 2. Surface: Smooth, flat, and mill phosphatized for field painting as specified in Section 09 91 00.
- D. Stainless Steel Sheet: ASTM A240 or ASTM A666, Type 304, dead soft, fully annealed, 2D finish, smooth flat surface. Provide for flashings in contact with soil and where indicated.

2.02 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: As specified in Section 07 65 26.

2.03 MISCELLANEOUS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- 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.
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.
 - 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.
 2. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
 3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A153 or ASTM F2329 or Series 300 stainless steel.
- C. Solder:
1. For Stainless Steel: ASTM B32, Grade Sn60, with an acid flux of type recommended by stainless steel sheet manufacturer.

2. For Zinc-Coated (Galvanized) Steel: ASTM B32, Grade Sn50, 50-percent tin and 50-percent lead or Grade Sn60, 60-percent tin and 40-percent lead.
- D. Sealant Tape: Pressure-sensitive, 100-percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape 1/2-inch wide and 1/8-inch thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane, polysulfide or silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.
- I. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.04 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Cheney Flashing Company, Fry Reglet Corporation, Hohmann & Barnard, Inc., Keystone Flashing Company, Inc. or approved equal. Form to provide secure interlocking of separate reglet and counterflashing pieces, compatible with flashing material. Provide factory-mitered and -welded corners and junctions and interlocking counterflashing on exterior face of same metal as reglet.
 1. Material: 0.022-inch galvanized steel.
 2. 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.
 3. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
 4. 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.
 5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 6. Provide counterflashing wind-resistant clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.05 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness and other characteristics. Fabricate items at the shop to the greatest extent possible.
 1. Fabricate sheet metal flashing and trim in thickness or weight required 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 without excessive oil canning, buckling, and tool marks and true to line and levels, with exposed edges folded back to form hems.

4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed 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 and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or form compatible, non-corrosive metal. Fabricate of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- F. Seams: Fabricate non-moving seams with flat-lock seams. Form seams and seal with elastomeric sealant. Rivet joints where required for strength.

2.06 LOW SLOPE ROOF SHEET METAL FABRICATIONS

- A. Copings: Fabricate in minimum 96-inch long, but not exceeding 10-foot long sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight.
 1. Profile: As indicated.
 2. Joint Style: Butt with 12-inch wide concealed backup plate and 6-inch wide exposed cover plates.
 3. Fabricate from the following material:

Material	Thickness
Galvanized Steel	0.040"

- B. Counterflashing: Fabricate from the following material:

Material	Thickness
Galvanized Steel	0.022"

- C. Roof Penetration Flashing: Fabricate from the following material:

Material	Thickness
Galvanized Steel	0.028"

- D. Roof-Drain Flashing: Fabricate from the following material:

Material	Thickness
Stainless Steel	0.016"

2.07 WALL SHEET METAL FABRICATIONS

- A. 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 material:

Material	Thickness
Galvanized Steel	0.022"

2.08 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:

Material	Thickness
Galvanized Steel	0.028"

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions with installer present, to verify actual locations, dimensions 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.
- B. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

- A. Self-adhering Sheet Underlayment: Install as specified in Section 07 65 26.

3.03 INSTALLATION

- A. General: Anchor sheet metal flashing and trim and other components securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants and other miscellaneous items as required to complete sheet metal flashing and trim.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. 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. Anchor each cleat with two fasteners, Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated and required for a watertight installation.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
 - 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. Coat back side of uncoated aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10-feet with no joints allowed within 24-inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with sealant concealed within joints.
- D. Seal joints as required for watertight construction.
 - 1. Where sealant-filled joints are used, 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 moderate, 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 specified in Section 07 92 00.
- E. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2-inches, except reduce pre-tinning where pre-tinned surface would show in completed work.
 - 1. Do not solder metallic-coated steel and aluminum sheet.
 - 2. Pre-tinning is not required for zinc-tin alloy-coated stainless steel and zinc-tin alloy-coated copper.
 - 3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Remove flux and spatter from exposed surfaces.
 - 4. Stainless Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.04 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for required wind pressures.
 - 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate.
 - 2. Anchor interior leg of coping with screw fasteners and washers at 24-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a 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. Extend counterflashing 4-inches over base flashing. Lap counterflashing joints a minimum of 4-inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.
- 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.

3.05 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations. Coordinate installation of wall flashing with installation of wall opening components including windows, doors, and louvers.

3.06 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.

3.07 INSTALLATION 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 as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.08 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. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a 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.

3.09 CONSTRUCTION WASTE MANAGEMENT

- A. General: As specified in Section 01 50 13.
- B. Scrap metal shall be collected for recycling.

END OF SECTION

SECTION 07 65 26

SELF-ADHERING SHEET FLASHING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installation modified bituminous sheet flashing material under metal flashings, plaster accessories, and where indicated.
- B. Related Sections:
 - 1. Construction waste management is specified in Section 01 50 13.
 - 2. Fluid-applied weather-resistive air and moisture barrier membrane is specified in Section 07 27 00.
 - 3. Sheet metal flashing and trim is specified in Section 07 62 00.
 - 4. Joint sealants are specified in Section 07 92 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Furnish manufacturer's standard product data sheets and installation recommendations and instructions. Include written instructions for evaluating, preparing and treating substrates as well as technical data including tested physical and performance properties.
- C. Installer qualifications.

1.03 QUALITY ASSURANCE

- A. Installer: Certified or approved by the self-adhering sheet flashing manufacturer to install the specified products with a minimum of 5-years' continuous experience installing the specified materials.
- B. Mock-up: Construct an on-site mock-up showing installation of self-adhering flashing. Mock-up shall incorporate materials to be used and installation techniques to be employed. Do not begin installation of self-adhering sheet flashing until mock-up is approved by the Architect. Approved mock-up shall serve as an installation quality standard for self-adhering sheet flashing on the Project.

1.04 JOB CONDITIONS

- A. Apply flexible flashings in fair weather at temperatures of 40-degrees F. and above.
- B. Provide adequate ventilation of enclosed spaces where primer is used.

1.05 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Store materials in their original, sealed packages, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing.

07 65 26 SELF-ADHERING SHEET FLASHING

- C. Store materials in clean, dry and protected location and within temperature range required by the manufacturer. Protect stored materials from direct sunlight.
- D. Remove and replace materials that cannot be applied within stated shelf life.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Fortifiber Corporation "FortiFlash 40 mil Waterproof Flashing", GCP Applied Technologies "Ultra", Carlisle Coatings & Waterproofing Inc. "CCW WIP 300HT", Henry Company "Blueskin PE200 HT", Owens Corning "WeatherLock Metal High Temperature Underlayment" or approved equal.

2.02 MATERIALS

- A. Self-Adhering Sheet Flashing: 40-mil thick consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied.
 - 1. Thermal Stability, ASTM D1970: Stable after testing at 240-deg. F.
 - 2. Low Temperature Flexibility, ASTM D1970: Passes after testing at minus 20-deg. F.
 - 3. Water Vapor Permeance: <.05 perms 40-Mil (waterproof); ASTM F1249.
 - 4. Water Resistance: 200 hours (waterproof); ASTM D779.
- B. Primer: As recommended by membrane manufacturer for priming substrates to receive modified bituminous sheet flashing.
- C. Joint Sealant: Certified by self-adhering flashing manufacturer as being compatible with flashing.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions under which self-adhering sheet flashing will be applied with installer and manufacturer's representative present for compliance with requirements and for other conditions affecting performance of the self-adhering sheet flashing system. Do not proceed with installation until unsatisfactory conditions have been corrected and reviewed by the Architect.
- B. Installation of self-adhering sheet flashing constitutes acceptance of substrate conditions.

3.02 PREPARATION

- A. Remove dust, dirt, loose fasteners and other protrusions. Clean, prepare and treat substrates according to manufacturer's written instructions. Provide clean, sound and dry substrate.
- B. Prime substrates to receive self-adhering sheet flashing if required by manufacturer. Allow primer to dry for one hour or until tack-free. Re-prime surfaces not covered within 36-hours.

3.03 INSTALLATION

07 65 26 SELF-ADHERING SHEET FLASHING

A. Self-Adhering Sheet Flashing:

1. Install self-adhering sheet flashing in accordance with manufacturer's written instructions. Ensure that flashing adheres continuously with the substrate and is free of wrinkles, fishmouths, bubbles, creases and other irregularities.
2. Comply with temperature restrictions of underlayment manufacturer for installation. Use primer rather than nails for installing at low temperatures.
3. Apply in shingle fashion to shed water, with end laps of not less than 6-inches staggered 24-inches between courses.
4. Overlap side edges not less than 3-1/2-inches.
5. Carefully notch and fold flashing corners and returns.
6. Roll installed flashing with roller.
7. Installed membrane shall be covered as soon as possible with subsequently applied covering material. Do not leave membrane exposed to the weather for longer periods than approved by the manufacturer.

3.04 COMPLETION

- A. Remove and replace self-adhering sheet flashing that does not comply with specified requirements. Holes in the flashing shall be patched with a minimum 6-inch overlap or in accordance with the self-adhering sheet flashing manufacturer's instructions.

3.05 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 07 71 23 GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel gutters and downspouts.

1.02 RELATED SECTIONS

- A Section 09 91 00 - Painting: Field painting of metal surfaces.

1.03 REFERENCES

- A. ANSI/ASTM A446 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- B. ANSI/ASTM B32 - Solder Metal.
- C. ASTM A525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- D. FS O-F-506 - Flux, Soldering, Paste and Liquid.
- E. FS QQ-S-571 - Solder, Tin Alloy, Tin-Lead Alloy and Lead Alloy.
- F. SMACNA - Architectural Sheet Metal Manual.

1.04 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Indicate on shop drawings, general construction, configurations, jointing methods and locations, fastening methods, locations and installation details.
- C. Provide product data on prefabricated components.

1.05 QUALITY ASSURANCE

- A. Conform to SMACNA Manual Drawings for nominal sizing of components for rainfall intensity determined by a storm occurrence of 1 in 100 years.
- B. Applicator: Company specializing in sheet metal flashing work with five year minimum experience.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 01 25 13 - Product Options and Substitutions
- B. Store and protect products under provisions of Section 01 25 13 - Product Options and Substitutions
- C. Stack preformed material to prevent twisting, bending or abrasion, and to aid ventilation. Slope to drain.
- D. Prevent contact with materials during storage which may cause discoloration, staining or damage.

PART 2 - PRODUCTS

2.02 MATERIALS

- A. Copper: 18 gauge

2.03 COMPONENTS

- A. Gutters: 6" half round gutter with back lip and heavy duty copper fascia hanger
- B. Downspouts: 4" round copper in 18 gauge or 3 1/2" O.D. x 1/8" thk. Galvanized steel pipe, refer to elevations for location.
- C. End Caps, Downspout Outlets, Rain Diverters, Gutter Downspout Straps, Support Brackets, Joint Fasteners, Downspout Strainers, Bird Screens: Profiled to suit gutters and downspouts.

2.04 ACCESSORIES

- A. Anchorage Devices: SMACNA requirements per Figure 1-35A.
- B. Gutter Supports: Brackets, straps.
- C. Downspout Supports: Steel brackets.
- D. Protective Backing Paint: Zinc chromate alkyd.
- E. Protective Back Coating: FS TT-C-494, bituminous.
- F. Solder: ANSI/ASTM B32; 50/50 type.

G. Flux: FS O-F-506.

2.05 FABRICATION

- A. Form gutters and downspouts of profiles and sizes indicated.
- B. Form transitions for a snug fit.
- C. Field measure site conditions prior to fabricating work.
- D. Fabricate with required connection pieces.
- E. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance.
- F. Hem exposed edges of metal.
- G. Solder metal joints. After soldering, remove flux. Wipe and wash solder joints clean.
- H. Fabricate gutter and downspout accessories; solder watertight.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work and conditions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of substrate.

3.02 INSTALLATION

- A. Install gutters, downspouts, transitions and accessories.
- B. Join lengths with soldered watertight. Flash and solder gutters to downspouts and accessories.
- C. Apply backing paint to metal back surfaces.
- D. Apply bituminous protective backing on surfaces in contact with dissimilar materials.
- E. Slope gutters 1/8 inch per foot minimum.

- F. Solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizer solution and rinse with water.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing firestopping.
- B. Related Sections:
 - 1. Joint sealants are specified in Section 07 92 00.
 - 2. Gypsum board is specified in Section 09 29 00.
 - 3. Acoustic insulation is specified in Section 09 81 00.
 - 4. Electrical is specified in Division 26.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide firestopping systems capable of closing or filling through-penetrations created by the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or by the deflection of sheet metal due to thermal expansion.
- B. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
- C. For firestopping exposed to view, provide products when flame-spread values of less than 25 and smoke-developed values of less than 450, when tested in accordance with ASTM E84.

1.3 SUBMITTALS

- A. General: Comply with the requirements in Division 01.
- B. Product Data: Manufacturer's descriptive, technical data and illustrations. Include manufacturer's installation instructions.
- C. Certification:
 - 1. Manufacturer's certification that products comply with local regulations controlling use of volatile organic compounds (VOC's) and are nontoxic to building occupants.
 - 2. Manufacturer's certification that firestopping materials comply with ASTM E814 and UL 1479.
- D. UL Design Numbers: Furnish UL Design No. from the "Fire Resistance Directory - Volume II" for each required penetration type and configuration. Indicate which materials will be used in firestopping the penetration. Reference architectural, mechanical, plumbing and electrical drawings.
- E. Furnish documentation indicating deflection and elongation capacity of all head of wall assemblies are equivalent in capacity to design assemblies.

1.4 QUALITY ASSURANCE

- A. Firestopping materials and systems shall be listed and labeled in accordance with requirements of Underwriters Laboratories, Inc. (UL) Building Materials Directory.
- B. Firestopping materials shall conform to California Building Code (CBC) for fire resistance standards and requirements for penetrations in walls, partitions, and floor/ceiling and floor/roof assemblies.

- C. Firestopping materials shall comply with ASTM E814 and UL 1479.
- D. Form materials to remain in place in the completed work and sealant used for firestopping work shall be UL listed and labeled.
- E. Firestopping materials shall be rated as required when tested in accordance with ASTM E119.
- F. Firestopping materials shall be asbestos free and shall not incorporate nor require the use of hazardous solvents.
- G. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surface.
- H. Installer shall have a minimum of 5-years experience installing UL listed firestop systems in similar type construction.

1.5 JOB CONDITIONS

- A. Follow manufacturer's instructions for temperature, ventilation, and other conditions for mixing and installing foam seals.
- B. Observe and follow manufacturer's precautions when using materials considered toxic and hazardous.
- C. Maintain current copy of UL "Fire Resistance Directory" on Project site.
- D. Installation of firestopping shall precede finishing of gypsum board.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with the requirements in Division 01.
- B. Deliver materials in the manufacturer's unopened containers and packages with manufacturer's name, labels, product identification, lot numbers, and mixing and installation instructions, as applicable.
- C. Store materials in unopened containers and packages, and under conditions recommended by manufacturer.
- D. Store and handle firestopping materials in accordance with manufacturer's Material Safety Data Sheets.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilation: Ventilate firestopping in accordance with manufacturers' instructions by natural means or forced air circulation.

1.8 SEQUENCING AND SCHEDULING

- A. Perform work of this and other Sections in proper sequence to prevent damage to the firestopping materials and to ensure that their installation will occur prior to enclosing or concealing work.
- B. Do not cover firestopping materials until they have been properly inspected and accepted by the authority having jurisdiction.

PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the penetrating items.
- B. Accessories: Provide components of each firestopping system required to install fill materials. Use only components specified by firestopping manufacturer and which are approved by UL for the designated fire-resistance-rated system.
- C. Manufacturers or systems not listed in UL "Fire Resistance Directory" but who can furnish certification of UL approval may be used in the work.

2.2 THROUGH-PENETRATION FIRESTOPPING MATERIALS

- A. General: Listed manufacturers of through-penetration firestopping are intended as guidelines only; manufacturer and material type shall be as required by the UL Design No. for each penetration to receive firestopping.
- B. Approved Manufacturers: Hilti Construction Chemicals, Inc., International Protective Coatings Corp., Specified Technologies, Inc., The RectorSeal Corporation, Tremco, Inc., 3M Fire Protection Products or approved equal.
- C. Provide mortar, sealants and caulk, putty, wrap strips, pillows, bags, and other types required for UL Design No. for each penetration to receive firestopping.

2.3 MINERAL FIBER FIRESTOPPING MATERIALS

- A. Material: Semirigid mineral fiber insulation, minimum 4-pcf density; USG Interiors "Thermafiber Safing", Johns Manville "Insul-Shield", Thermal Ceramics Inc. "Cerablanket F.S" or approved equal.
- B. Foil-Faced Curtain Wall Insulation: Hilti Firestop Systems, USG Fire Stop Systems "Foil-Faced Thermafiber Curtain Wall" or "FireSpan Insulation" or approved equal, 2-inch thick, 8-pcf density.
- C. Support Clips: Manufacturer's standard impaling clips or custom designed to suit installation conditions, fabricated from galvanized sheet steel.
- D. Smoke Sealant: Thermafiber "Smoke Seal Compound", "Firecode Compound" or "Fire Barrier", Specified Technologies Inc. "SpecSeal AS200 Elastomeric Spray" or "SpecSeal Fast Track Spray", 3M "FireDam 100 Spray" or as indicated in the applicable UL Design No. for required fire-rating.

2.4 FIRESTOPPING AT ELECTRICAL BOXES AND UTILITY OUTLETS

- A. Utility penetrations in walls, ceilings, or floors requiring protected openings shall be firestopped and sealed with an approved material securely installed, capable of maintaining its integrity when subjected to test temperatures specified in ASTM E814.
- B. Steel electrical outlet boxes on opposite sides of walls requiring protected openings shall be separated by a horizontal distance of 24-inches.
- C. Steel electrical outlet boxes which occur in combination with outlet boxes of any size such that the aggregate area of unprotected outlet boxes exceeds 100-square inches in any 100-square feet of wall area shall be protected by an approved material or detail to decrease the aggregate area of unprotected utility boxes to less than 100-square inches in any 100-square feet of wall.
- D. Steel electrical outlet boxes which exceed 16-square inches in area shall be protected by 3M "Moldable Putty Pads", Specified Technologies, Inc. "SpecSeal Series SSP Putty Pads" or approved equal.
- E. Utility and electrical outlets or boxes shall be securely fastened to the stud or framing of the wall or ceiling assembly. The opening in the gypsum board shall be cut so that the clearance between the box and the gypsum board does not exceed 1/8-inch.
 1. Fill the 1/8-inch gap with an approved fire-rated sealant.

2.5 FIRESTOPPING AT METAL DECK FLUTES

- A. Steel Deck Insert: Fyre Sleeve Industries, Inc., "Q-Stop" or approved equal one-piece fire-retardant plug for steel deck flutes.
- B. Fire-Rated Sealant: GCP Applied Technologies "FS-3000", Hilti "CP-672 Speedspray" or CFS-SP WB "Firestop Joint Spray", 3M "Firedam Spray", Tremco "Tremstop Acrylic" or approved equal.
- C. Mineral Wood: Minimum 4-pcf density.

2.6 MIXING

- A. For those products requiring mixing prior to application, comply with manufacturer's instructions.

2.7 ESCUTCHEONS

- A. Provide brushed stainless steel escutcheon plates at pipes and conduit exposed to view. Size to suit penetration.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect openings and voids to be sealed to determine if conditions are satisfactory for the proper installation of firestopping. Do not commence work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer.
 - 1. Remove foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
 - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping.
 - 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by manufacturer using manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of the work. Remove tape as soon as possible.

3.3 EXTENT OF FIRESTOPPING WORK

- A. General: Provide solid continuous firestopping wherever the penetration or addition of a construction element through or adjacent to a fire-rated floor, wall or partition, or roof creates a discontinuity of such a rated separation. Application limited in size and configuration to tested systems. Do not install insulation types specified in other Sections in lieu of specified firestopping materials.
- B. Building Exterior Perimeters:
 - 1. Provide mineral fiber type firestopping for full depth of structural floor, filling spaces resulting where exterior facing construction continues past a structural floor.
 - 2. Provide whether or not there are clips, angles, plates, or other members bridging or interconnecting the exterior wall and floor systems, and whether or not such items are continuous.

- C. Interior Walls and Partitions: Where top edge of a fire-rated wall or partition abuts a fluted-type metal deck, provide mineral fiber and fire-rated sealant to fill flute spaces for the full depth or width of the wall or partition.
- D. Penetrations:
 - 1. Penetrations include conduit, cable, wire, pipe, duct, and other elements which pass through one or both outer surfaces of a fire-rated floor, roof, wall, or partition.
 - 2. Verify that annular space around sprinkler pipes through fire-rated walls and floors is provided as required by NFPA 13.
- E. Fire Rated Partitions:
 - 1. Gaps exceeding 1/2-inch at smoke rated and fire-rated partitions shall be firestopped with a firestop sealant as listed in UL "Fire Resistance Directory" and as specified. Apply minimum 3/8-inch bead at intersection of finish material and adjacent surface, both sides and along entire perimeter.
 - 2. Intersections at fire-rated partitions and steel deck type floor-ceiling or roof-ceiling assemblies shall be firestopped as required.
- F. Provide firestopping to fill miscellaneous voids or openings at fire-rated construction as specified.

3.4 INSTALLATION

- A. Do not install firestopping until building is sufficiently enclosed or protected against adverse weather conditions, applied fireproofing work, including repairs, has been completed, and supporting framing and surrounding construction is in a dry condition.
- B. Prepare and install firestopping in accordance with manufacturer's instructions.
- C. Mineral Fiber:
 - 1. Provide in thickness for compressing into voids for a tight friction fit when installed.
 - 2. Provide in width sufficient to fill the depth of the void space using single width pieces.
 - 3. Install with ends tight against terminal end construction, and with intermediate joints well compressed together and tight.
 - 4. For vertical void spaces, provide support clips near each end, spaced not over 24-inches on center.
- D. Building Perimeter Firestopping:
 - 1. Install firestopping of proper width in safe-off area on safing clips spaced 12- to 24-inches on center or as recommended by firestopping manufacturer, leaving no voids. Cut firestopping wider than opening to ensure compression fit.
 - 2. Where required by UL Design No., install smoke sealant in accordance with manufacturer's instructions and as required by UL Design No. Cover the exposed surface of the mineral wool with a wet film thickness of 1/8-inch and overlap the material a minimum of 1/2-inch onto the adjacent curtain wall assembly and concrete floor slab. If the spray process is stopped and the applied liquid cures to an elastomeric film before the process is restarted, overlap the edge of the cured material at least 1/8-inch with the spray.
- E. Foam:
 - 1. Provide form materials to retain foam when placed.
 - 2. Prime contact surfaces as recommended by foam manufacturer.

3. Inject foam into void spaces so foam develops full and complete contact with adjoining surfaces, and the space is free from air pockets.
 4. Cure foam 24-hours, remove form materials not required to remain, and inspect.
 5. Provide additional foam or sealant to fill insufficient depth and remaining voids.
- F. Sealants:
1. Prepare penetrations in vertical and horizontal surfaces as required to receive finish products.
 2. Install damming materials as required.
 3. Apply caulk or putty in accordance with manufacturer's recommendations.
- G. Steel Deck Plugs: Provide at steel deck flutes at all full-height sound-rated partitions unless otherwise indicated.
- H. Finish surfaces of exposed to view firestopping to a uniform and level condition.
- I. Firestopping shall not extend past edges of cover plates, escutcheons, etc. or where it will be exposed to view in the final assembly.
- J. Install escutcheon plates at pipes and conduit exposed to view.

3.5 FIELD QUALITY CONTROL

- A. Identify firestop systems after installation. Identify the firestop system that has been installed and include the appropriate UL Design Number.
- B. At fire-rated walls, partitions, smoke barriers and other walls required to have protected openings or penetrations, provide a sign or stenciling on each side of the wall above the accessible ceiling stating that penetrations through fire-rated walls and partitions are not permitted unless such penetrations or openings are protected with firestopping meeting code requirements. Letters shall not be less than 1/2-inch in height. Repeat at intervals not exceeding 10-feet measured horizontally. Signs or stenciling shall comply with CBC Chapter 7 requirements.

3.6 CLEANING

- A. Remove spilled and excess materials without damaging adjacent surfaces.
- B. Leave finished work in neat, clean condition with no evidence of spill-overs or damage to adjacent surfaces.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing joint sealants.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Firestopping sealants are specified in Section 07 84 00.
 - 3. Joint sealants related to flashing and sheet metal work are specified in Section 07 62 00.
 - 4. Acoustical joint sealants are specified in Section 07 92 19.
 - 5. Glazing sealants are specified in Section 08 80 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's technical data for each product required, including instructions for joint preparation and sealant application. Include certification by joint sealant manufacturer that sealants, primers, and cleaners comply with local regulations controlling the use of volatile organic compounds (VOC).
- C. Samples: Manufacturer's bead samples of actual products showing full range of colors available, for each product exposed to view.
- D. Test Reports:
 - 1. Certified test results of elastomeric sealants showing compliance with specified requirements. Include results of aged performances including hardness, stain-resistance, adhesion and cohesion under cyclic movement, low temperature flexibility, modulus of elasticity at 100-percent strain, affects of heat and aging, and affects of accelerated weathering.
 - 2. Preconstruction field test results indicating which products and joint preparation methods demonstrated acceptable adhesion to joint substrates.
- E. Certificates: Manufacturer's certification that joint sealants comply with specified requirements and are suitable for uses indicated.
- F. Warranty.

1.03 QUALITY ASSURANCE

- A. Installer's Qualifications: Completion of at least 3 installations similar in type and size to this Project.
- B. Obtain joint sealant materials from a single manufacturer for each product required unless otherwise approved.
- C. Preconstruction Field Testing: Prior to installation of joint sealants, field-test adhesion to joint substrates.

1. Install joint sealants in 5-foot joint lengths. Allow to cure before testing. Test adhesion by pulling sealant out of joint according to "Method A, Field-Applied Sealant Joint Hand Pull Tab", in Appendix X1 in ASTM C1193. 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.
2. Perform field tests for each type of elastomeric sealant and joint substrate.
3. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
4. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
5. 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 substrate during testing.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver materials in the unopened, original containers or unopened packages with manufacturer's name, labels, product identification, color, expiration period, curing time and mixing instructions for multi-component materials.
- C. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturers.

1.05 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install sealants when ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer, or to wet joint substrates.
- B. Joint Width Conditions: Do not install sealants when joint widths are less than permitted by sealant manufacturer.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.06 WARRANTY

- A. Exterior Sealants: Furnish a written warranty against leaks or other defects of materials and workmanship for a period of 10-years. Defects include but are not limited to changes in the structural, physical or chemical properties of the sealant materials that impair function or require abnormal maintenance, changes in surface finish, color or texture, failure in adhesion, weather resistance or durability, failure to prevent entry of water, or failure to comply with specified requirements.
- B. This warranty shall not cover formation of cracks or defects in substrate materials adjacent to the seal, joint movement in excess of movement rating of sealant, or physical damage caused by others.
- C. Repair or replace defective materials and workmanship during warranty period without expense to Owner, including removal and replacement of other items as required.
- D. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Exterior and interior exposed joint sealant colors shall be custom color to match adjacent finish. Where joint sealants adjoin more than one surface color, provide custom colors as selected by Architect.
- B. Provide joint sealers, joint fillers and other materials that are compatible with one another and with joint substrates, as demonstrated by testing and field experience.

2.02 ELASTOMERIC JOINT SEALANTS

- A. Exterior Building Sealant: One-part silicone complying with ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O Dow Corning Corp. "790" or "795", Tremco "Spectrem 1", GE, Pecora or approved equal. Sealant shall resist ultra-violet, heat, ozone and moisture exposure and shall withstand substrate surface temperatures as high as 250-deg. F. and a surface temperature range of 150-deg. F.
- B. Sanitary Sealant: One-part mildew-resistant silicone; ASTM C920 Type S; Grade NS; Class 25; Uses NT, G, A and O; formulated with fungicide for sealing interior joints with nonporous substrates around ceramic tile, showers, sinks and plumbing fixtures; Dow Corning Corp. "786 Mildew Resistant", GE "Sanitary 1700", Tremco Tremsil 200 or approved equal.
- C. Horizontal Joint Sealant: Two-part pourable urethane; ASTM C920, Type M; Grade P; Class 25; Uses T, M, A and O; Pecora Corp. "NR-200 Urexpan", Sonneborn "MasterSeal CR 100", Tremco, Inc. "THC-900/901" or approved equal. Horizontal joint sealant shall have a minimum Shore A hardness of 30.
- D. Sealants in Contact with Self-Adhesive Sheet Membrane: Dow Corning Corp. 758 or approved equal.

2.03 LATEX JOINT SEALANTS

- A. Interior Building Sealant: Acrylic-emulsion; one-part, non-sag, mildew-resistant, complying with ASTM C834, formulated to be paintable; Pecora Corp. "AC-20", Tremco Inc. "Tremco Acrylic Latex 834" or approved equal.

2.04 JOINT FILLERS FOR CONCRETE PAVING

- A. Joint Filler: Preformed cork strips complying with ASTM D1752 for Type II or preformed sponge rubber strips complying with ASTM D1752 for Type I.

2.05 JOINT SEALANT BACKING

- A. General: Provide sealant backings which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved by sealant manufacturer.
- B. Plastic Foam Joint-Fillers: Preformed, compressible, resilient, non-waxing, non-extruding, non-outgassing strips of plastic foam, of size, shape and density to control sealant depth. Backer rods shall be 25-percent wider than the joint width.
 - 1. For exterior joints, provide Nomaco, Inc. SOF-ROD or approved equal bi-cellular extruded polyolefin backer rod complying with ASTM C1330, Type B.
 - 2. For interior joints provide open cell polyurethane complying with ASTM C1330, Type A.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer. Provide self-adhesive tape where applicable.

2.06 MISCELLANEOUS MATERIALS

- A. Primer: As recommended by joint sealant manufacturer for adhesion of sealant to joint substrates.
- B. Cleaners for Nonporous Surfaces: Non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

07 92 00 JOINT SEALANTS

- C. Masking Tape: Non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
 - 1. Remove foreign material from joint substrates which could interfere with adhesion of joint sealant, including dust, paints, oil, grease, waterproofing, water repellents, water, and surface dirt.
 - 2. Clean porous surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or acid washing to produce a clean, sound substrate. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints.
 - 3. Remove laitance and form release agents from concrete.
 - 4. Clean non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint sealant manufacturer. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond, do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces. Remove tape immediately after tooling without disturbing joint seal.

3.02 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Provide temporary ventilation during installation of interior joint sealants.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
 - 1. Install joint-fillers to provide sealant support for optimum performance cross-sectional shapes and depths.
 - a. Do not leave gaps between ends of joint-fillers.
 - b. Do not stretch, twist, puncture or tear joint-fillers.
 - c. Remove absorbent joint-fillers which have become wet prior to sealant application and replace with dry material.
 - 2. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joints where required to prevent third-side adhesion of sealant to back of joint.
- D. Installation of Sealants: Install sealants by proven techniques to contact and full wet joint substrates, completely filling recesses provided for each joint configuration and providing uniform, optimum performance cross-sectional shapes and depths.
- E. Tooling of Non-sag Sealants: Tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.03 PROTECTION AND CLEANING

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage.
- B. Cut out and remove damaged or deteriorated joint sealers and reseal joints with matching new materials.
- C. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by sealant manufacturer.

3.04 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Close and seal tightly all partly used sealant containers and store protected in well ventilated fire-safe area at moderate temperatures.
- C. Place used sealant tubes and containers in areas designated for hazardous materials.

END OF SECTION

SECTION 07 92 19

ACOUSTICAL JOINT SEALANTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing acoustical joint sealants.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Joint sealants are specified in Section 07 92 00.
 - 3. Acoustic insulation is specified in Section 09 81 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's technical data for each product required, including instructions for joint preparation and sealant application. Include certification by joint sealant manufacturer that sealants, primers, and cleaners comply with local regulations controlling the use of volatile organic compounds (VOC).
- C. Samples: Manufacturer's bead samples of actual products showing full range of colors available, for each product exposed to view.
- D. Certificates: Manufacturer's certification that joint sealants comply with specified requirements and are suitable for uses indicated.

1.03 QUALITY ASSURANCE

- A. Installer's Qualifications: Completion of at least 3 installations similar in type and size to this Project.
- B. Obtain joint sealant materials from a single manufacturer for each product required unless otherwise approved.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver materials in the unopened, original containers or unopened packages with manufacturer's name, labels, product identification, color, expiration period, curing time and mixing instructions for multi-component materials.
- C. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturers.

1.05 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install sealants when ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer, or to wet joint substrates.
- B. Joint Width Conditions: Do not install sealants when joint widths are less than permitted by sealant manufacturer.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.01 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant at Concealed Locations: Non-skinning, non-hardening, flexible sealant, capable of spanning 1/2-inch wide x 3/8-inch deep gaps. Synthetic rubber based products comply with ASTM D217 and acrylic rubber based products comply with ASTM C834. Tremco "Tremco Acoustical Sealant", USG "Sheetrock Acoustical Sealant", Pecora "AC-20 DTR" or approved equal.
- B. Acoustical Sealant at Exposed Locations: Non-oxidizing, skinnable, paintable, gunnable sealant recommended for sealing interior exposed joints to reduce transmission of airborne sound; Pecora Corp. "AC-20 FTR Acoustical and Insulation Sealant" or approved equal.

2.02 MISCELLANEOUS MATERIALS

- A. Sheet Caulking for Junction Boxes: Lowry's Electrical Box Sealer, Tremco Sheet Caulking or approved equal.
- B. Sheet Caulking for Junction Boxes at Fire-Rated Assemblies: Hevi-duty/Nelson "Firestop Putty Pads", Specified Technologies, Inc., Hilti CP-617 or approved equal.
- C. Backing Rod: Closed-cell, neoprene rod or polyethylene foam.
- D. Expanding Foam Sealant: UL Class 1 fire-retardant. Macklanburg Duncan "Polycell Expanding Foam", Dow "Great Stuff Pro – Gaps & Cracks" or approved equal.
- E. Cementitious Sealant: GCP Applied Technologies "Monokote Z-147" or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's instructions for installation conditions.
- B. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated. Install sealants in accordance with manufacturer's instructions.
- C. Install sheet caulking to seal the back and sides of junctions boxes recessed in sound rated partitions.
- D. Install acoustical sealant as a continuous bead along gypsum board face layer at all head and sill conditions of sound-rated partitions and around the perimeter of resilient ceilings.
- E. Install cementitious foam sealant where indicated and where multiple pipes or conduits penetrate sound-rated construction.

3.02 PROTECTION

- A. Protect installed insulation from harmful exposures and from physical damage.

3.03 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Close and seal tightly all partly used sealant containers and store protected in a well ventilated fire-safe area at moderate temperatures.
- C. Place used sealant tubes and containers in areas designated for hazardous materials.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing hollow metal doors, door frames, interior window frames, and associated accessories.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Flush wood doors are specified in Section 08 14 16.
 - 3. Door hardware is specified in Section 08 71 00.
 - 4. Glass and glazing is specified in Section 08 80 00.
 - 5. Painting is specified in Section 09 91 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Furnish for each type of door and frame, including details of construction, materials, dimensions, hardware preparation, core, label compliance, profiles, and finishes.
- C. Shop Drawings: Include details of each frame type, elevations of door types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items. Reference architectural details, door number and hardware group.
- D. Door Schedule: Furnish complete schedule of doors and frames using same reference numbers for details and openings as those on the drawings.

1.03 QUALITY ASSURANCE

- A. Steel doors and frames shall comply with ANSI A250.8 "Recommended Specifications Standard Steel Doors and Frames" and the specified requirements.
- B. Fire-Rated Doors: Provide hollow metal doors and frames that comply with California Building Code (CBC) Chapter 7; are identical in materials and construction to units tested in door and frame assemblies in accordance with NFPA 252 or UL 10C; and are labeled and listed by UL, Warnock Hersey, or other testing and inspection agency acceptable to authorities having jurisdiction. Labels shall comply with NFPA 80 and be permanently affixed to the door.
- C. Hollow metal doors and frames shall comply with positive pressure test requirements of NFPA 252 or UL 10C and shall be labeled accordingly by the door and frame manufacturer in a manner approved by authorities having jurisdiction. Door label shall include hourly rating followed by the letter "S" indicating conformance with air leakage resistance testing, serial number, and the listing agency's certification mark.
- D. Temperature-Rise Rating: At exit enclosures and exitways, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure. In addition to the requirements specified for positive pressure test requirements in Paragraph D. above, the door label shall include temperature rise rating.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.

08 11 13 HOLLOW METAL DOORS AND FRAMES

- B. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage.
- C. Inspect doors and frames upon delivery for damage. Minor damage may be repaired provided finish items are equal to new work and acceptable to Architect; otherwise remove and replace damaged items as directed.
- D. Store doors and frames at building site under cover. Place units on minimum 4-inch high wood blocking. Avoid use of non-vented plastic or canvas shelters that could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4-inch space between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Assa Abloy / Ceco Door Products, Assa Abloy / Curries Company, Assa Abloy / Security Metal Products, Republic Doors and Frames, Allegion / Steelcraft or approved equal. Manufacturer shall be a SDI Certified Manufacturer.

2.02 MATERIALS

- A. Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A526, commercial quality, or ASTM A642, drawing quality, hot dipped galvanized in accordance with ASTM A653, A60 or G90 coating designation, mill phosphatized.
- B. Supports and Anchors: Fabricate of not less than 16-gauge, galvanized where used with galvanized frames.
- C. Inserts, Bolts and Fasteners: Manufacturer's standard units. Where items are built into exterior walls, hot-dip galvanize in accordance with ASTM A153, Class C or D as applicable.
- D. Shop Applied Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.

2.03 DOORS

- A. Provide metal doors of ANSI A250.8 grades and models specified.
 - 1. Interior Flush Doors: Level 2, heavy duty, Model 2 except minimum 14-gauge galvanized steel faces.
 - 2. Interior Stile and Rail Doors: Level 3, extra heavy duty, Model 3, minimum 14-gauge galvanized steel faces.
 - 3. Exterior Flush Doors: Level 3, extra heavy duty, Model 2, minimum 14-gauge galvanized steel faces.
 - 4. Exterior Stile and Rail Doors: Level 3, extra heavy duty, Model 3, minimum 14-gauge galvanized steel faces.
- B. Door Louvers: Sight-proof stationary louvers, constructed of inverted V-shaped or Y-shaped blades formed of 24-gauge galvanized steel set into minimum 20-gauge galvanized steel frame.
- C. Internal Construction: Unitized steel grid or vertical steel stiffeners with internal sound deadener on inside of face sheets, in accordance with ANSI A250.8 requirements. Exterior doors shall have a polyurethane or polystyrene core.
- D. Clearance: Not more than 1/8-inch at jambs and heads. Not more than 3/8-inch at bottom. Threshold clearances as indicated.
 - 1. Fire Doors: Provide clearances according to their listing except where more stringent requirements are specified.

- E. Edges:
 - 1. General: Beveled latch stile for single doors, and meeting stile for pair doors; square elsewhere.
 - 2. Stile Edges: No seams are allowed on vertical stile edges.
 - 3. Top and Bottom Edges: Reinforced with 16-gauge steel channels; both edges flush and made watertight for exterior doors, top edge flush for interior doors.
- F. Glazing: Provide minimum 20-gauge steel non-removable glazing stops on the outside of exterior doors and on the secure side of interior doors. Glazing beads on the inside of glass panels shall be removable.

2.04 DOOR AND FIXED WINDOW FRAMES

- A. One-Piece Welded Frames: 16-gauge. Fabricate frames with mitered or coped and continuously welded corners.
- B. Glazing Beads: Provide frame glazing beads in interior glazed openings and other locations where fixed glass is indicated. Prepare frames for the type of glazing beads required to receive the glass and gaskets indicated. Miter or butt join beads at corners. Glazing beads shall be screw-on type to receive countersunk flat head machine screws.
- C. Anchors:
 - 1. Provide a jamb anchor for each 2'-6" of door or window height or fraction thereof.
 - 2. Fabricate from minimum 16-gauge sheet steel.
 - 3. Vary anchor types to provide positive fastening to adjacent construction.
 - 4. Secure a metal clip angle at bottom of each jamb member for anchoring to floor, with a minimum of two fasteners.
 - 5. Items to be built into exterior walls shall be hot-dip galvanized after fabrication in accordance with ASTM A153, Class B.
- D. Door Silencers: Except on weatherstripped or smoke gasketed frames, drill stops to receive 3-silencers on strike jambs of single-swing frames and 2-silencers in heads of double-swing frames.
- E. Plaster Guards: Provide 26-gauge steel plaster guards or mortar boxes at back of hardware cutouts.

2.05 FABRICATION

- A. Fabricate steel doors and frames to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at Project site. Comply with ANSI A250.8 requirements.
- B. Tolerances: Comply with SDI-117, "Manufacturing Tolerances Standard Steel Doors and Frames" unless otherwise indicated or specified.
- C. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from galvanized steel.
- D. Fabricate all doors and frames from galvanized sheet steel in accordance with SDI-112. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gauge inverted steel channels with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.
- E. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat heads for exposed screws and bolts.

- F. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware in accordance with final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A250.6 for door frame preparation for hardware.
 - 1. For concealed overhead door closers, provide space, cutouts, reinforcing and provisions for fastening in top rail of doors or head of frames, as applicable.
- G. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping of surface-applied hardware may be done at Project site.
- H. Locate hardware as indicated on final shop drawings and in accordance with Door Hardware Institute (DHI) "Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames".
- I. Shop Painting: Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
 - 1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
 - 2. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive paint finish.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install steel doors, frames, and accessories in accordance with the manufacturer's instructions, the requirements of ANSI/SDI, and final reviewed Shop Drawings.
- B. Placing Frames: Comply with provisions of ANSI A250.8 and SDI-112 unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.
 - 1. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
 - 2. In stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. Attach wall anchors to studs with screws.
 - 3. Install fire-rated frames according to their listings.
 - 4. Install head anchors at mid span for openings exceeding 48-inches.
- C. Door Installation: Fit hollow metal doors accurately in frames, within specified clearances.
 - 1. Fire-Rated Doors: Install with clearances specified in their listings and as specified

3.02 ADJUST AND CLEAN

- A. Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
 - 1. Remove rust before touch-up is applied.
 - 2. Touch-up shall not be obvious.
- B. Repair damaged galvanizing with galvanizing repair paint.
- C. When complete, exposed surfaces and edges shall be clean, straight, and free from dents, scratches, and other damage and defects.

D. Doors and finish hardware shall operate smoothly, quietly, and free from bind.

3.03 CONSTRUCTION WASTE MANAGEMENT

A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.

B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing flush wood doors.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Hollow metal doors and frames are specified in Section 08 11 13.
 - 3. Finish hardware is specified in Section 08 71 00.
 - 4. Painting is specified in Section 09 91 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's descriptive and technical data and illustrations for each type of door including details of core and edge construction, and trim for openings.
- C. Shop Drawings: Indicate location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other data.
 - 1. Shop drawings shall comply with North American Architectural Woodwork (NAAWS) Section 1 – Submittals.
 - 2. Furnish a Woodwork Institute “Certified Compliance Label” on the first page of the shop drawings.
- D. Samples:
 - 1. Submit 24-inch square or larger samples as specified or required to represent required characteristics. Resubmit samples until approved.
 - a. Doors for Transparent Finish: Door faces with solid wood edging representing typical range of color and grain for each species of veneer. Samples shall be representative of the complete range of wood veneer colors to be expected in the work.
 - 2. Furnish full-size door for transparent finish showing the complete range of color and grain to be expected in the completed work. Resubmit until sample is approved by the Architect. Approved sample will be used to judge the acceptability of transparent finished door veneer and may be used in the Project.
- E. Warranty.

1.03 QUALITY ASSURANCE

- A. Fire-Rated Doors: Provide wood doors that comply with California Building Code (CBC) Chapter 7; are identical in materials and construction to units tested in door and frame assemblies in accordance with NFPA 252 or UL 10C; and are labeled and listed by UL, Warnock Hersey, or other testing and inspection agency acceptable to authorities having jurisdiction. Labels shall comply with NFPA 80 and be permanently affixed to the door.
- B. Allowable Tolerances:

08 14 16 FLUSH WOOD DOORS

1. Warp Tolerance: As specified in Section WDMA T-2. In addition, warp tolerance shall apply to pairs of doors and to doors in relation to the frame or jamb in which hung.
 2. Squareness: WDMA T-3.
 3. Gap Tolerance: As specified in NAAWS Section 9, Section 4.3.8 and Section 6.1.20.
 4. Flushness of Joinery: As specified in NAAWS Section 9, Section 6.1.21.
- C. Flush wood doors and steel frames specified in Section 08 11 13 shall comply with positive pressure test requirements of NFPA 252 or UL 10C and shall be labeled accordingly by the door and frame manufacturer in a manner approved by authorities having jurisdiction. Door label shall include hourly rating followed by the letter "S" indicating conformance with air leakage resistance testing, serial number, and the listing agency's certification mark.
- D. Temperature-Rise Rating: At exit enclosures and exitways, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure. In addition to the requirements specified for positive pressure test requirements in Paragraph D. above, the door label shall include temperature rise rating.
- E. WI Certified Compliance Program (CCP):
1. Before delivery to the Project site, provide a Woodwork Institute Certified Compliance Certificate itemizing the products to be provided and certifying that they meet the requirements of NAAWS and of the Plans and Specifications.
 2. Upon completion of installation, furnish a WI Certified Compliance Certificate for the installation.
 3. In the event of question as to compliance with the referenced standard of any item of work, the Architect may require independent inspection service of questioned items as specified in "Independent Inspection Service" of WI "Services and Quality Control Options" published by the WI.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver doors individually protected with polyvinyl or plastic wrap, identified with manufacturer's name, and name and type of door. Identify each door with same symbol used on door schedule. Leave protection on door during construction.
1. Comply with NAAWS – Section 2 for delivery, storage, and handling of doors.
- C. Store doors covered and flat, supported above a level surface in a dry, well ventilated building in compliance with NAAWS – Section 2.
- D. Do not subject doors to extremely high or low temperatures or humidity.
- E. Handle with clean gloves; do not drag doors across one another or other surfaces.
- F. Certain wood species are light sensitive. Protect doors from exposure to natural and artificial light after delivery.

1.05 PROJECT CONDITIONS

- A. Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of construction period in compliance with the requirements specified in NAAWS – Section 2.

1.06 WARRANTY

08 14 16 FLUSH WOOD DOORS

- A. Warrant each solid core interior door against defects in materials and workmanship for the life of the original installation, including costs of re-hanging. Defects include, but are not limited to the following:
 - 1. Cores shall not telegraph through door faces. Stile, rail, and core show-through shall be considered a defect when the face of the door varies from a true plane in excess of 0.010-inch in a 3-inch span.
 - 2. Doors shall not have warped (bow, cup, or twist) more than that permitted in NAAWS Section 6.1.21.
- B. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Algoma Hardwoods, Inc., Eggers, Graham, Marshfield Door Systems, VTI, Western Oregon Door or approved equal.

2.02 FLUSH WOOD DOORS, GENERAL

- A. Type: Flush veneered, five-ply construction. Doors with seven-ply construction will not be acceptable.
- B. Door Grade:
 - 1. Fabricate flush wood doors to receive opaque finish in accordance with NAAWS, Custom Grade.
 - 2. Fabricate flush wood doors to receive transparent finish in accordance with NAAWS, Premium Grade.
- C. Cross Banding: Manufacturer's standard, minimum 1/16-inch thick. Fire-retardant treated where required by testing agency.
- D. Door Thickness: 1-3/4-inches, unless otherwise indicated.
- E. Fabricate wood doors in sizes indicated for either job-site fitting or factory fit doors to suit frame-opening sizes indicated, at the Contractor's option. Doors shall comply with the following uniform clearances and bevels:
 - 1. Non-rated Doors:
 - a. Jambs and Heads: 1/8-inch.
 - b. Meeting Stiles of Pairs of Doors: 1/8-inch.
 - c. Bottom of Door to Top of Finish Floor: 1/2-inch at concrete and resilient flooring, 3/8-inch at carpet, tile, threshold and other finish flooring.
 - 2. Fire-rated Doors: Comply with requirements of CBC Chapter 7 and NFPA 80.
- F. For doors that are pre-machined, factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.
- G. Factory Finishing:

08 14 16 FLUSH WOOD DOORS

1. Doors to be Field Painted: Prime paint doors suitable for field painting as specified in Section 09 91 00. Seal cut-outs, edges, and other surfaces not otherwise finished.
2. Transparent Finish Doors: Pre-finish to match Architect approved samples as follows:
 - a. NAAWS Section 5, Premium Grade.
 - b. Finish: Manufacturer's standard finish with performance requirements comparable to NAAWS Section 5, System 12 – Polyurethane, Water-Based, complying with VOC requirements.
 - c. Staining: Match Architect approved sample.
 - d. Effect: Filled finish.
 - e. Sheen: Satin, 31- to 45-degrees.

2.03 INTERIOR FLUSH WOOD DOORS

- A. Veneer:
 1. Painted Doors:
 - a. Veneer Species and Grade: NAAWS Grade A, Birch or other close grain hardwood.
 2. Transparent Finish Doors
 - a. Veneer Species and Grade: NAAWS Grade AA, species and cut to be selected by the Architect.
 - b. Veneer Matching: Book and center balance matching.
 - c. Pairs and Sets: Provide pair matching and set matching for pairs of doors and for doors hung in adjacent sets.
 - d. Doors in same room or area shall be matched for color and grain.
- B. Adhesive: WDMA IS-1.6, Type II adhesive bond or better for cores, Type I adhesive bond for faces and cross bands.
- C. Cores:
 1. 20-Minute Fire-Rated Doors and Non-rated Doors (PC-5): Solid particleboard conforming to ANSI A208.1, Grade LD-2, made with binder containing no urea-formaldehyde resin.
 2. Fire-Rated Doors Greater than 20-Minute Rated (FD-5): Incombustible mineral approved by labeling authority. Provide top, bottom, and intermediate blocking for surface-mounted hardware.
- D. Edge Construction:
 1. 20-Minute Fire-Rated Doors and Non-rated Doors:
 - a. Stiles and Rails: Minimum 1-3/8-inch wide by full core thickness glued to core. Provide wider hinge stile where recommended by door manufacturer for door size and type of hinges to be used. Exposed edges of stiles shall be smooth, straight cut, free from knots, pitch pockets, and other defects for a minimum distance of 1/4-inch from the outside edge along the entire stile.

08 14 16 FLUSH WOOD DOORS

- b. Species:
 - 1) Stiles: Close-grain hardwood for doors to receive paint finish. Same species as face veneer for doors to receive transparent finish.
 - 2) Rails: Hardwood or softwood at manufacturer's option.
- c. Edge Banding: Minimum 1/2-inch wide by full core thickness. Edge bands if used may reduce the width of stiles and rails.
 - 1) Species for doors to receive paint finish shall be close-grain hardwood.
 - 2) Species for doors to receive transparent finish shall be same as face veneer.
- 2. Fire-Rated Doors Greater than 20-Minute Rated:
 - a. Top Rail: Door manufacturer's standard special laminated material.
 - b. Stiles and Rails: Hardwood, fire-retardant treated where required by label. Sizes required by testing agency.
- 3. Bevel non-rated doors 1/8-inch in 2-inches at lock and hinge edges.
- 4. Bevel fire-rated doors 1/8-inch in 2-inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

2.04 DOOR LOUVERS

- A. Type: Prefabricated 20-gauge steel units.
- B. Opening Sizes: As scheduled.
- C. Finish: Manufacturer's standard baked-enamel finish, of color selected by Architect.

2.05 VISION LIGHT FRAMES

- A. Approved Manufacturer: Anemostat Door Products "LoPro" or approved equal.
- B. Material: 20-gauge cold rolled steel.
- C. Finish: Manufacturer's standard shop primer for field painting as specified in Section 09 91 00.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine door frames and verify that frames are of the correct type and have been installed as required for proper hanging of corresponding doors. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Condition doors to average prevailing humidity in installation area prior to hanging.

3.03 INSTALLATION

- A. Install wood doors in accordance with the manufacturer's printed instructions, as indicated and in accordance with NAAWS Section 9.
- B. Factory-finished doors shall be installed just prior to Substantial Completion.

08 14 16 FLUSH WOOD DOORS

- C. Fire-Rated Doors: Install in fire-rated frames in accordance with requirements of NFPA Standard No. 80.
- D. Job-Fit Doors: For doors not factory-machined, align and fit doors in frames with uniform clearances and bevels as specified; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Fitting Clearances:
 - a. Non-rated Doors:
 - 1) Jambs and Heads: 1/8-inch.
 - 2) Meeting Stiles of Pairs of Doors: 1/8-inch.
 - 3) Bottom of Door to Top of Finish Floor: 1/2-inch at concrete and resilient flooring, 3/8-inch at carpet, tile, thresholds and other finish flooring.
 - b. Fire-rated Doors: As specified in CBC Chapter 7 and NFPA 80.
 - 2. Bevel non-rated doors 1/8-inch in 2-inches at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8-inch in 2-inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- F. Cutouts, Recesses, and Exposed Rail Edges: Unless factory provided, paint with two coats of clear sealer, each coat well dried, before hardware is set in place.
- G. Meeting stiles of pairs of doors shall be in alignment along the entire height, and offset between adjacent leaves shall not exceed 1/8-inch.

3.04 ADJUSTING AND PROTECTION

- A. When complete, doors shall be flat within allowable tolerance, shall be plumb in all positions of swing, and shall operate smoothly, quietly, and free from binding. Re-hang or replace doors that do not swing or operate freely.
- B. Exposed surfaces shall be uniform in appearance, clean and free from scratches, tool marks, dents, discoloration, stains, and other damage and defects.
- C. Refinish or replace doors damaged during installation.
- D. Protect doors as recommended by door manufacturer to ensure that doors will be without damage or deterioration at completion of Project.

3.05 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13.
- B. Separate the following categories for salvage or re-use on the site:
 - 1. Sheet materials larger than 2-sq. ft.
 - 2. Solid wood trim longer than 16-inches and multiple offcuts of any size larger than 12-inches.
- C. Separate the following for recycling. Material shall be placed in source-separated or comingled recycling bins.
 - 1. Composite wood.

2. Clean dimensional lumber.
- D. Separate the following categories for disposal and place in designated areas for hazardous materials:
1. Treated, stained, painted, or contaminated wood.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section includes fire-resistive rated and non-rated access doors, panels, and frames.
 - 1. Not all access doors are explicitly indicated on Drawings. Provide all access doors required by the various trades and coordinated as to location and size, whether specifically indicated or not.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Non-structural metal framing is specified in Section 09 22 16.
 - 3. Painting is specified in Section 09 91 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Submit manufacturer's catalog cuts and product data on each type of access door. Include sizes, types, finishes, scheduled locations, and details of adjoining work. Submit manufacturer's recommended installation instructions.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Provide fire-rated access doors in fire-rated wall construction in accordance with California Building Code (CBC) Chapter 7.
 - 2. Manufacture fire-rated access doors and frames to conform to UL requirements. Provide labels indicating rating.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Recessed Access Doors in Drywall Substrates:
 - 1. Approved Manufacturers: J. L. Industries "Style WB", Karp Associates "Type KDW", Milcor "Style DW" or approved equal.
 - 2. Features:
 - a. Frame: 16-gage steel with an integral galvanized steel drywall bead.
 - b. Door: 14-gage steel, fitted flush with integral bead.
 - c. Hinges: Concealed spring hinges permitting 175-degree opening.

- d. Lock: Flush screwdriver operated cam locks for all access doors except provide flush key operated cylinder locks for access doors in all public areas.
- B. Stainless Steel Access Doors in Bathrooms and Wet Areas:
 - 1. Approved Manufacturers: J. L. Industries "Style TMS", Karp Associates "Type DSC-214M Stainless Steel", Milcor "Style MS" or approved equal.
 - 2. Features:
 - a. Frame: 16-gage stainless steel with a nominal 1-inch exposed frame flange. Provide galvanized steel anchors appropriate for substrate.
 - b. Door: 14-gage stainless steel, fitted flush with frame flange. Reinforce access doors over 24 inches wide to prevent sagging.
 - c. Hinges: Concealed spring hinges permitting 175-degree opening.
 - d. Lock: Flush key operated stainless steel cylinder locks.
- C. Fire Rated Steel Access Doors: UL 1-1/2-hour labeled, "Class B" fire-rated, and as follows:
 - 1. Approved Manufacturers: J. L. Industries "Style FD", Karp Associates "Type KPR-150 FR", Milcor "Insulated Fire-Rated Doors" or approved equal.
 - 2. Features:
 - a. Frame: 16-gage steel with a nominal 1-inch frame flange and integral appropriate anchors.
 - b. Door: 2-inch thick, fabricated of 20-gage steel face sheets, sandwich construction, with a non-combustible insulation core.
 - c. Hinges: Continuous stainless steel piano type hinge with stainless steel pin for the length of the door. Provide an automatic spring door closer for all doors.
 - d. Lock: Automatic latching device with operating turn ring and interior latch release. Provide flush key operated cylinder lock in all public areas.
- D. Access Doors in Sound-Rated Construction: Same as fire-rated access doors:
 - 1. Door Panel: Double wall insulated.
 - 2. Insulation: Minimum 1-1/2-inch thick mineral wool.
 - 3. Hinge: Continuous piano hinge.

2.02 FABRICATION

- A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts and ready for installation.
- B. Fabricate steel access doors and frames of continuous welded steel construction, unless otherwise indicated. Weld, fill, and grind joints smooth with adjacent surfaces to assure flush and square unit.

- C. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.
- D. Furnish all access doors and panels keyed alike.

2.03 FINISH

- A. Galvanized Steel Doors: Manufacturer's standard prime paint. Doors and frames will be field painted as specified in Section 09 91 00.
- B. Stainless Steel Doors: Buffed #4 satin finish.
- C. Aluminum Doors: Manufacturer's standard prime paint.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this section will be installed. Verify rough openings for doors and frames are correctly sized and located.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install drywall access doors flush with the contiguous surfaces.
- B. Install stainless steel access doors after surrounding tile work is completed; set flange tight against the face of tile.
- C. Install frames plumb and level in floor, wall and ceiling openings.
- D. Position to provide convenient access to concealed work requiring access. Coordinate installation with work of other trades.
- E. Secure rigidly in place in accordance with manufacturer's instructions.

3.03 ADJUST AND CLEAN

- A. Adjust hardware and panels after installation for proper operation.
- B. Remove and replace panels or frames which are warped, bowed or otherwise damaged.

3.04 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing exterior aluminum-framed entrances and storefronts, including entrance doors, sidelights, storefront-type framing system, and operable windows and transoms installed in storefront framing..
- B. Primary components of aluminum-framed entrances and storefronts include aluminum storefront framing, glass and glazing, sills and similar items indicated as integral components of the storefront system, joint sealants, flashings, anchors, shims, fasteners, accessories, and support brackets.
- C. Related Sections:
 - 1. Construction waste management is specified in Section 01 50 13.
 - 2. Joint sealants are specified in Section 07 92 00.
 - 3. Door hardware is specified in Section 08 71 00.
 - 4. Glazing is specified in Section 08 80 00.

1.02 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum-framed entrances and storefronts that comply with performance characteristics specified, as demonstrated by testing the manufacturer's corresponding stock assemblies according to specified test methods. Entrances and storefronts shall accommodate movements and tolerances of the building structure, including but not limited to live load and dead load deflection, creep, seismic drift, and adjacent material tolerances.
- B. Thermal Movement: Design the aluminum-framed entrances and storefronts to provide for expansion and contraction of the component materials resulting from a surface temperature range of 180-deg. F. without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects. Entrance doors and operable units shall function normally over the specified temperature range.
- C. Wind Loads: Provide aluminum-framed entrance and storefronts, including anchorage, capable of withstanding wind-load design pressures calculated according to the requirements of CBC Chapter 16A.
- D. Structural Performance: Conduct tests for structural performance in accordance with ASTM E330. At the conclusion of the tests there shall be no glass breakage or permanent damage to fasteners, anchors, hardware or actuating mechanism. Framing members shall have no permanent deformation in excess of 0.2-percent of their clear span.
 - 1. Deflection Normal to Plane of the Wall: Test pressure required to measure deflection of framing members normal to the plane of the wall shall be equivalent to the specified wind load. Deflection shall not exceed 1/175 of the clear span, when subjected to uniform load deflection test.
 - 2. Deflection Parallel to the Plane of the Wall: Deflection of any member carrying its full dead load shall not exceed an amount that will reduce glass bite below 75-percent of the design dimension and shall not reduce the edge clearance between the member and the fixed panel, glass or other fixed member above to less than 1/8-inch. The clearance between the member and an operable door or window shall be at least 1/16-inch.
- E. Air Infiltration:

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1. Provide aluminum-framed entrances and storefronts with an air infiltration rate of not more than 0.06-cfm per sq. ft. of fixed area, excluding operable door edges, when tested in accordance with ASTM E283 at an inward test pressure differential of 6.24-psf (50-mph wind load).
 2. Windows: When closed and locked, air infiltration rate shall not exceed 0.10-cfm/ft. of vent perimeter when tested in accordance with ASTM E283 at a static air pressure differential of 6.24-psf.
- F. Water Penetration:
1. Provide storefront framing systems with no uncontrolled water penetration, excluding operable door edges, as defined in the test method when tested in accordance with ASTM E331 at an inward test pressure differential of 12-psf.
 2. Windows: When closed and locked, there shall be no leakage as defined in ASTM E547 and ASTM E331 at a static air pressure differential of 12-psf.
- G. Water Management: Storefronts shall be designed and installed to allow for penetrating moisture to drain to the exterior. Provide end dams at sill flashing, water deflectors, sealed horizontal joints, weep slots and baffles, and other methods for water management. Show water management provisions on the shop drawings.
- H. Storefronts shall have a U-value and a SHGC as required by California T24.

1.03 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Furnish product data for each system showing manufacturer's standard details and fabrication methods, data on finishing, hardware, and accessories, and recommendations for maintenance and cleaning.
- C. Shop Drawings: Include for fabrication and installation, including large scale elevations, plans, full scale detail sections of typical members, anchors, reinforcement, expansion provisions, and glazing. Include full scale details at head, jambs, spandrels, sill and mullions for each opening.
1. Include structural analysis data signed and sealed by a qualified professional engineer, licensed in the State of California, responsible for their preparation. Clearly indicate all loads imposed on the primary building structure.
 2. Indicate interface with adjacent construction and flashings.
 3. Reference window types indicated on architectural window types drawings.
 4. Reference architectural elevation, plans, sections and details.
 5. Reference structural details and members.
 6. Indicate flashings, brake shape trim and closures.
 7. Show details of intersections of frame caps.
 8. Show building dimensions and proposed methods to accommodate live load deflections and column shortening.
 9. Show relative layout of walls, beams, columns and slabs. Indicate tolerances required for storefront installation that can be accommodated by the storefront system.
 10. Show perimeter sealant joint sizes, including tolerances and minimum/maximum joint sizes required.

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11. Show location of anchorage points and identification of the reaction loads imposed on the structure, including dead load and wind load reactions at each anchor location.
 12. Show path for water drainage from the system. Show methods incorporated into the design to collect, control, contain and evacuate secondary water infiltration from glazing channels, perimeter surrounding conditions and perimeter joint sealants.
 13. Include Project-specific installation instructions and details. Include perimeter framing joint conditions and internal joinery conditions. Indicate which framing members run thru, and how joints are to be sealed. Indicate sealant continuity notches used to prevent water infiltration by capillary action in the metal-to-metal joint and internal seals.
 14. Coordinate submittal with glazing submittals.
- D. Samples for Verification: Furnish two samples of each type and color of aluminum finish selected, on 12-inch long sections of extrusions or formed shapes and 6-inch square sheets.
 - E. Test Reports: Furnish certified test reports from a qualified independent testing laboratory showing that aluminum-framed entrances and storefronts have been tested in accordance with specified test procedures and comply with specified performance characteristics. Where such testing has not been performed, test through an independent testing laboratory or agency and furnish certified test results.
 - F. Warranty.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: A minimum of 5-years' experience in the manufacture of aluminum-framed entrances and storefronts of the types specified.
- B. Installer's Qualifications: Documented experience in the installation of systems similar to those required.
- C. Single Source Responsibility: Provide aluminum-framed entrances and storefronts produced by a single manufacturer.
- D. Mock-up:
 1. Erect a full-size storefront mock-up with typical framing and sheathing. Frame a rough opening for one of the typical storefronts as directed by the Architect. Schedule an installation meeting with the Owner, Contractor, Architect, and all related subcontractors; framer, sheet metal, flashing, storefront manufacturer representative, and installer.
 2. Install storefront in opening following each step as indicated, concluding with building paper for cement plaster, fiber cement siding and rain screen wood siding system, as applicable.
 3. Perform water infiltration test on installed mock-up. Test mock-up for compliance with specified performance requirements according to ASTM E1105 at minimum differential pressure of 20-percent of inward acting wind-load design pressure, but not less than 6.24-lbf/sq. ft.
 4. Perform air infiltration test on installed mock-up in accordance with ASTM E783. Allowable air infiltration shall not exceed 1.5 times the amount specified in the performance requirements.
 5. Issue notes and get concurrence from all parties involved that the installation is acceptable prior to installing storefronts.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.

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- B. Deliver aluminum-framed entrances and storefronts in the manufacturer's original protective packaging.
- C. Store aluminum components in a clean, dry location away from uncured concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air.
 - 1. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Check openings by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication with construction progress to avoid delay of the work.

1.07 WARRANTY

- A. Furnish written warranty covering aluminum-framed entrances and storefronts that fail in materials or workmanship within 5-years from date of Substantial Completion. Failures include, but are not limited to structural failures including excessive deflection, excessive leakage or air infiltration, faulty operation, and deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Storefront Framing: Kawneer Company "Trifab VersaGlaze 451T", Oldcastle BuildingEnvelope, Arcadia, CRL / US Aluminum or approved equal.
- B. Entrance Doors: Kawneer Company "500 Standard Entrances", Oldcastle BuildingEnvelope, Arcadia, CRL / US Aluminum or approved equal.
- C. Operable Windows and Transoms: Kawneer Company "GLASSvent UT Windows for Storefront Framing", Oldcastle BuildingEnvelope, Arcadia, CRL / US Aluminum or approved equal.

2.02 MATERIALS

- A. Aluminum Members: 6063-T5 alloy and temper.
- B. Fasteners: Series 300 nonmagnetic stainless steel.
 - 1. Do not use exposed fasteners except for application of hardware. For application of hardware, use Phillips flat-head machine screws countersunk flush that match the finish of member or hardware item being fastened.
- C. Concealed Flashing: Dead-soft stainless steel or extruded aluminum as selected by manufacturer for compatibility with other components.
- D. Brackets and Reinforcements: Aluminum or nonmagnetic stainless steel. Provide non-staining, non-ferrous shims for installation and alignment as required.
- E. Weatherstripping: Manufacturer's standard replaceable type. Provide weatherstripping on meeting stiles of pairs of doors and at bottom rail of each door leaf.
- F. Framing System Gaskets: Compression type, replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
- G. Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

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2.03 COMPONENTS

- A. Storefront Framing Systems: Provide storefront and entrance framing systems fabricated from extruded aluminum members of size and profile indicated. Include sub-frames and other reinforcing members as required. Provide for center glazed, glazed from the interior on all sides without projecting stops. Shop-fabricate and preassemble frame components where possible. Provide storefront frame sections without exposed seams. Provide compensating channels.
1. Mullion Size: 2-inch x 4-1/2-inch, thermal break
 2. Cover Caps: Provide manufacturer's standard profile cover caps as indicated.
- B. Stile-and-Rail Type Entrance Doors: Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and fillet welds.
1. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.
 2. Design: Wide stile with 12-inch bottom rail.
 3. Each door leaf shall be equipped with an adjusting mechanism located in the top rail near the lock stile, which provides for minor clearance adjustments after installation.
- C. Windows:
1. Window Type: Side or top hinged as indicated, project out.
 2. Performance Grade and Class: P-HC70 / C-HC70.
 3. Framing corners shall be coped and butt-type construction, neatly joined and mechanically secured with two screws per joint anchored into integral screw races. Framing joints shall be sealed with sealant meeting AAMA 803.3 to ensure a water-tight joint.
 4. Vent frame shall be tubular and corner construction shall be mitered with an internal clip, epoxy sealed, and mechanically staked.
 5. Each vent shall be equipped with stainless steel 4-bar hinges, cast white bronze cam locking handles and limit stops.
- D. Miscellaneous Brake Shapes: Provide headers, closures, anchors and supports as indicated and required. Fabricate from minimum 0.090-inch aluminum unless otherwise indicated.

2.04 FABRICATION

- A. General: Fabricate aluminum-framed entrances and storefronts to designs, sizes and thicknesses indicated, and to comply with specified standards. Sizes and profile requirements are indicated.
- B. Fabricate components that, when assembled, have the following characteristics:
1. Profiles are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 4. Physical and thermal isolation of glazing from framing members. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

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5. Provisions for field replacement of glazing from interior or exterior as standard for installed storefront framing.
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site. Disassemble components only where necessary for shipment and installation.
1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.
 2. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.
- D. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish.
1. Welding behind finished surfaces shall be performed to minimize distortion and discoloration on the finished surface.
- E. Reinforcing: Install reinforcing as required for hardware, performance requirements, sag resistance and rigidity.
- F. Dissimilar Metals: Separate dissimilar metals with bituminous paint, suitable sealant, elastomeric tape, or gasket between the surfaces. Do not use coatings containing lead.
- G. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members.
- H. Conceal fasteners wherever possible.
- I. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops. At other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.
- J. Provide miscellaneous aluminum brake metal closures and flashings as indicated, finished to match aluminum-framed entrances and storefronts.

2.05 FINISHES

- A. Exposed surfaces shall be free of scratches and other blemishes.
- B. Exposed surfaces shall be finished with a Class I integral or electrolytically-deposited color anodized finish conforming to AA-M12C22A42/A44, medium bronze color, as approved by the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions with installer present, for compliance and requirements for installation tolerances and other conditions affecting performance of the work.
- B. Do not begin installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation.
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Install components in proper alignment and relation to established lines. Provide proper support and anchor securely in place

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- C. Installation Tolerances:
 - 1. Variation from Plane: Do not exceed 1/8-inch in 12-feet of length or 1/4-inch in any total length.
 - 2. Offset from Alignment: The maximum offset from true alignment between two identical members abutting end-to-end in line shall not exceed 1/16-inch.
 - 3. Diagonal Measurements: The maximum difference in diagonal measurements shall not exceed 1/8-inch.
 - 4. Offset at Corners: The maximum out-of-plane offset of framing at corners shall not exceed 1/32-inch.
- D. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
 - 1. Paint dissimilar metals where drainage from them passes over aluminum.
 - 2. Paint aluminum surfaces in contact with mortar or concrete with alkali-resistant coating.
 - 3. Paint wood and similar absorptive material in contact with aluminum and exposed to the elements or otherwise subjected to wetting, with 2-coats of aluminum house paint. Seal joints between the materials with sealant.
- E. Drill and tap frames and doors and apply surface-mounted hardware in compliance with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
- F. Set sill members and other members in bed of sealant, or use joint fillers or gaskets to provide weathertight construction. Comply with requirements of Section 07 92 00.
- G. Where flashings are indicated adjacent to work specified in this Section, provide flashings in 0.040-inch aluminum unless otherwise indicated, finished to match entrances and storefronts.
- H. Set miscellaneous brake shapes flush with hairline joints to adjacent storefront systems.

3.03 ADJUSTING

- A. Adjust operating hardware to function properly for smooth operation without binding, and to prevent tight fit at contact points and weatherstripping.

3.04 FIELD QUALITY CONTROL

- A. Testing Agency: Engage an independent AAMA certified testing company to perform specified testing. Test a minimum of three different storefront types/assemblies. Storefront locations to be tested shall be as identified by Architect. Contractor shall include cost of testing in scope of work and bid.
- B. Water Penetration: Test areas of installed storefront framing systems for compliance with system performance requirements according to ASTM E1105, Procedure A, at minimum differential pressure of the full inward acting wind load design pressure, but not less than 4.18-lbf/sq. ft. Prior to performing test, install all exterior flashing, WRB, sheet metal, and cement plaster finish. Furnish test report to Owner, Contractor, and Architect prior to placing interior or exterior finishes and prior to installing other storefront framing.
(ACCEPTABLE ALTERNATIVE WINDOW WATER LEAKAGE TESTING METHOD- AAMA 501.2-15)
- C. Air Infiltration Test: Conduct tests in accordance with ASTM E783. Allowable air infiltration shall not exceed 1.5 times the amount specified in the performance requirements.
- D. Repair or remove work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

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3.05 CLEANING

- A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.
- B. Clean glass surfaces after installation, complying with the requirements specified in Section 08 80 00. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.06 PROTECTION

- A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.
- B. Provide adhered, non-marring strippable plastic protection over all framing members at time of installation, prior to glazing.

3.07 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

**SECTION 087100
DOOR HARDWARE**

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 commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

- B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

- C. Related Sections:

1. Division 08 Section "Door Hardware Schedule".
2. Division 08 Section "Hollow Metal Doors and Frames".

- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

- E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- D. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

- A. **Manufacturers Qualifications:** Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. **Installer Qualifications:** A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. **Door Hardware Supplier Qualifications:** Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- D. **Source Limitations:** Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- F. **Keying Conference:** Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.
- G. **Pre-Submittal Conference:** Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.

3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 1. Structural failures including excessive deflection, cracking, or breakage.
 2. Faulty operation of the hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Electrical component defects and failures within the systems operation.

- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Seven years for heavy duty cylindrical (bored) locks and latches.
 - 2. Five years for exit hardware.
 - 3. Twenty five years for manual surface door closer bodies.

1.8 MAINTENANCE SERVICE

- A. 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 door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 5. Acceptable Manufacturers:
 - a. Bommer Industries (BO).
 - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
 - c. Stanley Hardware (ST).
- B. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 certified pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed teflon coated stainless pin, and twin self lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Acceptable Manufacturers:
 - a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
 - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
 - c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 2. Furnish dust proof strikes for bottom bolts.
 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 5. Acceptable Manufacturers:

- a. Door Controls International (DC).
 - b. Ives (IV).
 - c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
- B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.
 - 1. Acceptable Manufacturers:
 - a. Door Controls International (DC).
 - b. Ives (IV).
 - c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
- C. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 - 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 - 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 - 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 - 4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 - 5. Acceptable Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Ives (IV).
 - c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinders: Original manufacturer cylinders complying with the following:
 - 1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
 - 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
 - 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 - 5. Keyway: Match Facility Standard.

- D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
 - 1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- E. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. New System: Key locks to a new key system as directed by the Owner.
- F. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).
 - 3. Construction Keys (where required): Ten (10).
- G. Construction Keying: Provide temporary keyed construction cores.
- H. Key Registration List (Bitting List):
 - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 - 2. Provide transcript list in writing or electronic file as directed by the Owner.
- I. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
 - 1. Acceptable Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).
- J. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into "Key Wizard" software.

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.
 - 1. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.

2. Locks are to be non-handed and fully field reversible.
3. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.2 requirements to 2 million cycles.
4. Acceptable Manufacturers:
 - a. Schlage (SC) – ND Series.
 - b. No Substitution.

2.6 AUXILIARY LOCKS

- A. Mortise Deadlocks, Large Case: ANSI/BHMA A156.13, Series 1000, Grade 1, certified large case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. One piece stainless steel bolts with a 1" throw. Deadlocks to be products of the same source manufacturer and keyway as other locksets.
 1. Acceptable Manufacturers:
 - a. Schlage (SC) - L9460 Series.
 - b. No Substitution.

2.7 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 4. Dustproof Strikes: BHMA A156.16.

2.8 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
 - b. Von Duprin (VD) - 35A/98 XP Series.

2.9 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Acceptable Manufacturers:
 - a. Norton Door Controls (NO) - 7500 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and

not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Acceptable Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Ives (IV).
 - c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

2.11 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Acceptable Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Ives (IV).
 - c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

2.12 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Acceptable Manufacturers:
1. National Guard Products (NG).
 2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
 3. Reese Enterprises, Inc. (RE).

2.13 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

Set 1 – New paired aluminum entry doors

Set 1B – Existing paired aluminum entry doors (Inspect existing hardware set and provide new trim, cylinder, and/or other accessories required to convert exit device to include interior cylinder dogging for “classroom operation.”)

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	FM300	630	MR
1	EA	KEYED REMOVABLE MULLION	KR4954-STAB-MT54	689	VON
1	EA	PANIC HARDWARE	PA-AX-XP-99-EO-Z	626	VON
1	EA	PANIC HARDWARE	PA-AX-XP-99-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX	626	SCH
2	EA	CORE	PER DISTRICT STANDARD	626	SCH
2	EA	DOOR PULL	T51-01-023	630	ELM
2	EA	SURFACE CLOSER	4050 RW/PA	689	LCN
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	MULLION SEAL	8780N	N	ZER
1	EA	THRESHOLD	PER DETAIL		

Provide interior cylinder for “classroom operation” to comply with AB 3205 per DSA BU 19-05.

Set 2 – New aluminum balcony door

1	Continuous Hinge	FM300	630	MR
1	Rim Exit Device	AX 99L-NL 2SI 996L-NL-R (F at rated doors) PA	US26D	VD
2	Core	Per district standard	626	SC
1	Cylinder	20-771 50-210	626	SC
1	Cylinder	20-757 50-210	626	SC
1	Surface Closer	PR7500	689	NO
1	Drop Plate	As required		
1	Door Stop	481H	US26D	RO
1	Threshold	PER DETAIL	AI	PE
1	Gasketing	by door mfg.		

Set 3 – Existing entry doors (Inspect existing hardware set and provide new trim, cylinder, and/or other accessories required to convert exit device to include interior cylinder dogging for “classroom operation.”)

Set 4 – New interior office door

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	VANDL ENTRANCE LOCK	ND92PD RHO	626	SCH
1	EA	FLOOR STOP	FS436	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

END OF SECTION 08 71 00

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for interior and exterior glass and glazing.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Hollow metal frames are specified in Section 08 11 13.
 - 3. Flush wood doors are specified in Section 08 14 16.
 - 4. Aluminum-framed entrances and storefronts are specified in Section 08 41 13.

1.02 DEFINITIONS

- A. Deterioration of insulating glass is defined as failure of hermetic seal due to other causes than breakage which results in intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating resulting from seal failure, and any other visual evidence of seal failure or performance.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide glass and glazing that has been produced, fabricated and installed to withstand normal thermal movement, wind loading and impact loading (where applicable), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.
- B. Normal thermal movement is defined as that resulting from an ambient temperature range of 120-deg. F. and from a consequent temperature range within glass and glass framing members of 180-deg. F.
- C. Provide heat strengthened glass lites where recommended by glass manufacturer as determined by glass stress analysis calculations based on glass unit sizes indicated and shading patterns occurring on the glass. Furnish copies of the glass stress analysis calculations and show the location of glass units required to be heat strengthened on the shop drawings.

1.04 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's technical data for each glazing material and fabricated glass product required, including installation and maintenance instructions.
- C. Samples: 12-inch square samples of each type of glass indicated and specified except for clear single pane units, and 12-inch long samples of each type of sealant or gasket exposed to view.
- D. Shop Drawings: Show location of exterior glass units required to be heat strengthened based on glass stress analysis calculations.
- E. Calculations: Furnish calculations showing glass stresses based on glass lites and shading patterns. Calculations shall be prepared by the glass manufacturer and shall be signed by a registered professional engineer licensed in the State of California.
- F. Warranty.

1.05 QUALITY ASSURANCE

08 80 00 GLAZING

- A. Glazing Standards: Comply with recommendations of the following manufacturer and associations except where more stringent requirements are specified:
 - 1. Glass Association of North America (GANA) "Glazing Manual" and "Sealant Manual".
 - 2. Sealed Insulating Glass Manufacturers Association (SIGMA): TM-3000 "Vertical Glazing Guidelines".
- B. Safety Glass: Where safety glass is indicated or required, provide products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.
- C. Insulating Glass Certification Program: Provide insulating glass units permanently marked with appropriate Insulating Glass Certification Council (IGCC) certification label.
- D. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that required for this Project, with a record of successful in-service performance.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Protect glazing materials during delivery, storage, and handling; comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture, temperature changes, direct exposure to sun and from other causes.

1.07 PROJECT CONDITIONS

- A. Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when glazing channel substrates are wet.
- B. Install glazing sealants at ambient and substrate temperatures above 40-deg. F.

1.08 WARRANTY

- A. Insulating Glass: Furnish written warranty signed by glass manufacturer, agreeing to furnish replacements for those insulating glass units developing manufacturing defects as defined, within 10-years from date of Substantial Completion.
- B. Mirror Glass: Furnish written warranty agreeing to furnish replacement mirrors for those units developing silver spoilage within 15-years from date of Substantial Completion.
- C. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 GLASS PRODUCTS

- A. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Thickness as indicated, specified, or recommended by glass manufacturer.
- B. Manufacture heat-treated glass by horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed.

2.02 GLASS TYPES

- A. Clear Insulating Glass with Low E Coating: PPG "Solarban 70XL" or approved equal insulating glass with Low E coating, comprised of an outer lite of two panes of 1/8-inch thick clear float laminated together with a 0.030-inch thick clear plastic interlayer with Low E coating on No. 2 surface, 1/2-inch air space, and 1/4-inch thick tempered glass inner lite. Nominal 1-inch unit thickness unless otherwise indicated. Glass shall have a U-value and SHGC as required by California T24.
- B. Spandrel Glass: Insulating opaque spandrel glass to match the appearance of clear insulating glass.

2.03 ELASTOMERIC GLAZING SEALANTS

- A. General: Comply with recommendations of sealant and glass manufacturer's for selection of glazing sealants with performance characteristics suitable for applications indicated and conditions at time of installation.
 - 1. Compatibility: Select sealants with proven compatibility with other materials with which they will come into contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
 - 2. Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants which have performance characteristics suitable for applications indicated and conditions at time of installation.
 - 3. Colors: Color of exposed sealant as selected by Architect from manufacturer's standards.
- B. Silicone Glazing Sealant: One-part elastomeric silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25, Uses NT, G, A and 0 as applicable; Dow Corning 999, General Electric "SCS 1200", Rhone-Poulenc, Inc. "Rhodorsil 3B", Tremco "Proglaze" or approved equal.
- C. Glazing Sealant for Fire-Rated Glass: Metacaulk 990, DAP 1012 or approved equal, listed and approved by UL, Warnock Hersey or other approved testing agency.

2.04 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100-percent, non-staining and non-migrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged in rolls with a release paper backing, complying with AAMA 800.
- B. Expanded Cellular Glazing Tape: Closed-cell, polyvinyl chloride foam tape, factory coated with adhesive on both surfaces, packaged on rolls with release liner protecting adhesive, and complying with AAMA 800 for product 810.5.
- C. Glazing Tape for Fire-Rated Glass: EPDM or other approved flame resistant gasket material approved by testing agency.

2.05 GLAZING GASKETS

- A. Dense Elastomeric Compression Seal Gaskets: Molded or extruded neoprene, EPDM, or silicone gaskets of profile and hardness required to maintain watertight seal; complying with ASTM C864, D.S. Brown Co., Maloney, Tremco or approved equal.
- B. Soft Compression Gaskets: Extruded or molded closed cell, integral-skinned neoprene, EPDM, or silicone of profile and hardness required to maintain watertight seal; complying with ASTM C509, Type II, black; D.S. Brown Co., Maloney, Tremco or approved equal.

2.06 MISCELLANEOUS GLAZING MATERIALS

- A. Compatibility: Provide materials with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Neoprene, EPDM or silicone blocks as required, 80 to 90 Shore A durometer hardness.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement.
- F. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.
- G. Mirror Mastic: Palmer "Mirro-Mastic" or approved equal for securing glass mirrors.

2.07 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.
- B. Clean cut or flat grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Inspect work for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; presence and functioning of weep system on framing having weeps; existence of minimum required face or edge clearances; and for effective sealing of joinery. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean glazing channels and other framing members to receive glass. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are to be used.

3.03 GLAZING, GENERAL

- A. Comply with printed recommendations of glass, sealants, gaskets, and other glazing materials manufacturers.
- B. Coordinate with framing system manufacturers for proper glazing channel dimensions to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with acceptable tolerances.
- C. Protect glass from edge damage during handling and installation.
 - 1. Use a rolling block in rotating glass units to prevent damage to corners. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening.
 - 2. Remove and dispose of glass units with edge damage or other imperfections of a kind that would weaken glass when installed and impair performance and appearance.

- D. Apply primers to joint surfaces where required for sealant adhesion.
- E. Install setting blocks of proper size in sill rabbet, located to comply with referenced glazing standard. Set blocks in thin course of sealant.
- F. Provide spacers inside and out, of size and spacing to preserve required face clearances for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking to comply with requirements of referenced glazing standard except where otherwise required by glass unit manufacturer.
- H. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.
- I. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- J. Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.04 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 in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and 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.
- E. Do not remove release paper from tape until just before each lite is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape 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 center of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- C. Install gaskets so they protrude past face of glazing stops.

3.06 SEALANT GLAZING (WET)

- A. Install continuous spacers between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.07 PROTECTION AND CLEANING

- A. Protect glass from breakage. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances. Remove immediately by methods recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction for build-up of dirt, scum, alkali deposits or staining. Remove as recommended by glass manufacturer.
- D. Remove and replace glass which is broken, chipped, cracked, abraded or damaged during construction, including natural causes, accidents and vandalism.
- E. Wash glass on both faces not more than 4-days prior to date scheduled for inspection for Substantial Completion. Use methods recommended by glass manufacturers.

3.08 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 08 84 13

TRANSLUCENT GLAZING SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes requirements for furnishing and installing the following:
 - 1. Factory prefabricated structural insulated translucent sandwich panels.
 - 2. Aluminum installation system.
 - 3. Aluminum sill flashing.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Sheet metal flashing and trim is specified in Section 07 62 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's product data including details, material descriptions, profiles and component finishes.
- C. Shop Drawings: Include elevations and installation details.
- D. Samples: Furnish 12-inch square sandwich panel and 5-inch long factory-finish aluminum sections.
- E. Test Reports: The manufacturer shall submit certified test reports made by an independent testing organization for each type and class of panel system. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if by current manufacturer and indicative of products used on this project. Test reports required are:
 - 1. Flame Spread and Smoke Developed (ASTM E84 by UL 723)
 - 2. Burn Extent (ASTM D635)
 - 3. Color Difference (ASTM D2244)
 - 4. Impact Strength (Free-falling Ball Method)
 - 5. Tensile Bond Strength (ASTM C297) after aging by ASTM D1037
 - 6. Shear Bond Strength (ASTM D1002) after 5 different aging conditions
 - 7. Beam Bending Strength (ASTM E72)
 - 8. Insulation "U" Factor (by NFRC-100: ASTM C236, E1423, and C1199)
 - 9. NFRC System U-Factor Certification (NFRC 700).

10. Solar Heat Gain Coefficient (NFRC or Calculations).
11. Condensation Resistance Factor (AAMA 1503.1)
12. Air Leakage (ASTM E283).
13. Structural Performance (ASTM E330).
14. Water Penetration (ASTM E331).
15. 1200-deg. F. Fire Resistance (SWRI).

F. Warranty.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. Materials and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten consecutive years; and which can show evidence of these materials being satisfactorily used on at least 6 Projects of similar size, scope and location within such a period. At least 3 of the projects shall have been in successful use for 10-years or longer.
2. Panel system shall be listed by an NSI accredited Evaluation Service, which requires quality control inspections and fire, structural and water infiltration testing of sandwich panel systems by an accredited agency.
3. Quality control inspections shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with AC177 "Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems" as issued by the ICC-ES.

B. Installer Qualifications: Experienced installer who has been in the business of erecting specified materials for at least five consecutive years; and can show evidence of satisfactory completion of Projects of similar size, scope and type.

1.04 PERFORMANCE REQUIREMENTS

- A. Performance Requirements: The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.
- B. Furnish structural analysis data signed by a professional engineer.
- C. Panel system shall have less than 0.01-cfm/sq. ft. air leakage in accordance with ASTM E283 at 6.24-psf.
- D. Panel system shall have not water penetration in accordance with ASTM E331 at 15-psf.
- E. Structural Loads: Panel system shall be capable of resisting wind loads as required by California Building Code (CBC).

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. General: Comply with Section 01 66 00.

- B. Store translucent panels on the long edge, several inches above the ground, blocked and under cover to prevent warping in accordance with manufacturer's storage and handling instructions.

1.05 WARRANTY

- A. Warrant translucent glazing system to be free from defects in materials and workmanship for a period of 5-years from date of Substantial Completion. This warranty is in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. KalWall Corporation or approved equal. (ESR – 2464)

2.02 PANEL COMPONENTS

- A. Face Sheets

1. Translucent Faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.
 - a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.
 - b. Face sheets shall not deform, deflect or drip when subjected to fire or flame.
2. Interior Face Sheets:
 - a. Flame Spread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flame spread rating 25 or 50 and smoke developed no greater than 250 when tested in accordance with UL 723.
 - b. Burn extent by ASTM D 635 shall be no greater than 1-inch.
3. Exterior Face Sheets:
 - a. Color Stability: Full thickness of the exterior face sheet shall not change color more than 3 CIE Units DELTA E by ASTM D2244 after 5-years outdoor South Florida weathering at 5° facing south, determined by the average of at least three white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.
 - b. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact minimum of 70-ft. lbs. without fracture or tear when impacted by a 3-1/4-inch diameter, 5-lb. free-falling ball per UL 972.
4. Appearance:

- a. Exterior Face Sheets: Smooth 0.070-inch thick and crystal in color.
 - b. Interior Face Sheets: Smooth 0.045-inch thick and white in color.
 - c. Face sheets shall not vary more than \pm 10-percent in thickness and be uniform in color.
- B. Grid Core: Verti-Kal
- 1. Thermally-broken composite of aluminum and fiberglass I-beam grid core shall be of 6063-T6 or 6005-T5 alloy and temper with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I-beam shall be no less than 7/16-inch.
 - 2. I-beam Thermal break: Minimum 1-inch, thermoset fiberglass composite.
- C. Laminate Adhesive:
- 1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives".
 - 2. Minimum tensile strength of 750-psi when the panel assembly is tested by ASTM C297 after two exposures to six cycles each of the aging conditions prescribed by ASTM D1037.
 - 3. Minimum shear strength of the panel adhesive by ASTM D1002 after exposure to four separate conditions:
 - a. 50-percentRelative Humidity at 68° F: 540-psi.
 - b. 182° F: 100-psi.
 - c. Accelerated Aging by ASTM D1037 at room temperature: 800-psi.
 - d. Accelerated Aging by ASTM D1037 at 182° F: 250-psi.

2.03 PANEL CONSTRUCTION

- A. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.
- 1. Thickness: 2-3/4-inch.
 - 2. Light Transmission: 37-percent.
 - 3. Solar Heat Gain Coefficient: 0.33.
 - 4. Panel U-factor by NFRC Certified Laboratory: 0.53.
 - 5. Grid Pattern: As indicated or as selected by the Architect.

- B. Standard panels shall deflect no more than 1.9-inches at 30-psf in 10' 0" span without a supporting frame by ASTM E72.
- C. Standard panels shall withstand 1200° F fire for minimum one hour without collapse or exterior flaming.
- D. Thermally Broken Panels: Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.

2.04 BATTENS AND PERIMETER CLOSURE SYSTEM

- A. Closure System: Thermally-broken extruded aluminum 6063-T6 and 6063-T5 alloy and temper clamp-tite screw type closure system.
- B. Sealing Tape: Manufacturer's standard, pre-applied to closure system at the factory under controlled conditions.
- C. Fasteners: 300 series stainless steel screws for aluminum closures, excluding final fasteners to the building.
- D. Finish: Architectural corrosion resistant finish which meets the performance requirements of AAMA 605.2, color to be selected from manufacturer's standards.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prepare openings including isolating dissimilar materials from aluminum system which may cause damage by electrolysis, and shall provide temporary enclosures if required.

3.02 INSTALLATION

- A. Install translucent panel system in strict accordance with approved shop drawings. Fastening and sealing shall be in strict accordance with manufacturer's shop drawings and installation instructions. All aluminum shall be cleaned before sealants are applied.
- B. After installation, inspect translucent panel installation and make adjustments necessary to insure proper installation and weather-tight conditions.

3.03 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing light-gauge non-load bearing wall framing systems, including metal studs, wall furring, and backing plates.
- B. Related Sections:
 - 1. Thermal insulation is specified in Section 07 21 00.
 - 2. Acoustical joint sealants are specified in Section 07 92 19.
 - 3. Metal suspension systems are specified in Section 09 22 36.23.
 - 4. Gypsum board is specified in Section 09 29 00.
 - 5. Acoustic insulation is specified in Section 09 81 00.

1.2 DESIGN AND PERFORMANCE REQUIREMENTS

- A. General: Where stud gauge and spacing is not indicated, engineer non-structural metal framing to comply with the following requirements.
- B. Stud Systems: Select steel studs in accordance with manufacturer's standard load tables and the following deflection criteria based on stud depth and spacing indicated and partition height required:
 - 1. Partitions to Receive Gypsum Board: L/240.
 - 2. Partitions to Receive Tile Backer Board: L/360.
 - 3. Framed Ceilings: L/360.
- C. Structural supports and blocking for light fixtures and miscellaneous wall- or ceiling-mounted items shall be designed and engineered by Contractor.

1.3 SUBMITTALS

- A. General: Comply with the requirements in Division 01.
- B. Product Data: Manufacturer's specifications and installation instructions for each type of metal support system, including provisions for fixture and equipment anchorage.
- C. Shop Drawings: Show provision for fixture and equipment anchorage to stud systems different from typical systems or details indicated.

1.4 QUALITY ASSURANCE

- A. Tolerances: Provide metal studs and furring installations that are plumb, true, straight, and rigid.
- B. Welder's Qualifications: AWS D1.1 and 1.3 as applicable.
- C. Fire-Test-Response Characteristics: Provide components that comply with rating requirements specified for fire-rated assemblies under UL 2079 for non-load bearing wall systems.

1. Deflection Clips and Firestop Track: Connections and/or top runner provided in fire-resistance-rated assemblies shall be certified by UL 2079 for cyclic movement requirements.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. General: Comply with the requirements in Division 01.
- B. Deliver products in the original unopened packages, containers, or bundles with manufacturer's label intact and legible.
- C. Remove products delivered in broken, damaged, rusted or unlabeled condition from the Project site immediately.
- D. Protect products from rusting and other sources of damage.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. ClarkDietrich Building Systems., Consolidated Systems, Inc., SCAFCO, The Steel Network Inc. or approved equal.

2.2 MATERIALS

- A. Metal Studs:
 1. Material: Mill-certified galvanized steel conforming to ASTM A653, G40 coating, minimum yield strength 33,000-psi.
 2. Construction: Formed C-channel section conforming to ASTM C645.
 3. Size and Thickness: As indicated on drawings or as required for specified deflection criteria, based on stud depth and spacing indicated and partition height required. If stud spacing is not indicated, space studs at 16-inches on center.
- B. Runner Tracks:
 1. Material: Mill-certified galvanized steel conforming to ASTM A653, G40 coating, minimum yield strength 33,000-psi.
 2. Construction: Formed channel section conforming to ASTM C645.
 3. Size: Minimum 1-inch flange width; web depth matching studs.
 4. Thickness: Same as studs.
- C. Vertical Deflection Connection: The Steel Network Inc. "VertiClip" or "VertiTrack", FireTrak Corp "Shadowline", Metal-Lite "Slotted Slip Track" or approved equal conforming to the following material properties and performance criteria:
 1. Code Criteria: Meet required head of wall connection criteria as required by CBC and as indicated in UL2079 for cyclic wall movement.
 2. Material Composition: ASTM A653, SS grade 50, class 1, 50-ksi minimum yield strength, 65-ksi minimum tensile strength, G-60 hot dipped galvanized coating.
 3. Material Thickness: 0.036-inch.
 4. Clips shall be designed for positive attachment to structure and stud web using step-bushing technology to provide frictionless vertical movement.

5. Provide clips with attached bushing and screw of the series, size, and configuration as recommended by manufacturer.
 6. Top track devices pre-assembled to top track assembly in standard 12-foot lengths, with clips installed at spacing to coincide with stud spacing indicated may be used at Contractor's option.
 7. Friction-fit deep-leg track assemblies and tracks relying on steel flexure to perform are unacceptable.
- D. Metal Channels: Mill-certified galvanized steel conforming to ASTM C653, G40 coating, minimum yield strength 33,000-psi.
1. Framing, Furring, and Stiffening:

<u>Size, Inches</u>	<u>Pounds per 1,000 Lineal Feet</u>
3/4 cold rolled	300
1-1/2 cold rolled	475
2 cold rolled	590
 2. Furring Channels: Minimum 20-gauge galvanized steel with knurled faces; hat-shaped or Z-section as indicated or required.
- E. Tie Wire: No. 16-gauge, galvanized, single-strand annealed steel or No. 18-gauge, galvanized, double-strand annealed steel.
- F. Screws: ASTM C1002, Type S, pan head sheet metal screws, minimum 1/2-inch length.
- G. Runner Track Fasteners: Powder-actuated tempered-steel pins with corrosive resistant plating or coating, 9/64-inch diameter, minimum 1-1/8-inch penetration. The use of powder-actuated anchors is not permitted in concrete where the actual concrete strength exceeds the concrete strength at which the anchor has been tested to provide the required capacity unless the anchor capacity is verified by field testing.
- H. Backing Plates: Provide backing plates as indicated.
- I. Compression or Isolation Strips: Fiberglass, 1/2-inch nominal thickness, width equal to width of tracks or studs where used; density such that material will compress to one-half or less of loose thickness.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Verify that conditions are satisfactory for the installation of metal support systems. Do not commence the installation until unsatisfactory conditions have been corrected.
- B. Coordinate installation of metal support systems with the installers of other related work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install non-load-bearing steel framing members in accordance with ASTM C754, and as specified.
- B. Cutting:
 1. General: Cut framing components squarely or on angle as required to fit tightly with proper bearing against abutting members.
 2. Cutting Studs: If stud web is cut more than 50-percent, or stud flanges are cut, restore stud to original strength by wire-tying, or welding on steel reinforcement.

- C. When studs extend to the underside of structural slabs, secure at top with a slip connection to accommodate slab deflection.

3.3 NON-LOAD-BEARING VERTICAL METAL FRAMING

- A. Runner Tracks: Align at floor and ceiling with partition layouts. Secure to structure with specified fasteners located 2-inches from each end and spaced not to exceed 24-inches on center.

1. Coordinate installation of continuous isolation strips or acoustical sealant at acoustical partitions with installation of top and bottom runner tracks.
2. Where partition comes to underside of profile metal deck, create an acoustic seal to fill the profile. Use either metal plate or fiberglass and acoustic sealant, as indicated.
3. Notch runner tracks as required for curved partitions.
4. Where studs extend to structure above, provide vertical deflection accommodating devices where each stud connects to structural members above.

- B. Installation of Metal Studs:

1. Install studs spaced 16-inches on center unless otherwise indicated. Screw-fasten framing connections using a minimum of 2 screws for each connection.
2. At partition corners and intersections, provide a minimum of 3 studs.
3. Splice studs where required, by nesting with a minimum lap of 8-inches; fasten laps with 2 screws through each flange.
4. Unless otherwise indicated, frame door openings with double 16-gauge vertical studs securely attached to each jamb of door frame.
 - a. At head, install runner track; cut flanges at ends, bend web 90-degrees and screw attach to jamb studs.
 - b. Install jack studs over door opening, spaced same as full-height studs.
 - c. Where control joints extend upward from door jambs, install a jack stud spaced 1/2-inch from each jamb stud. Space next full-height stud not more than 6-inches from each jamb stud.
 - d. Attach jamb studs to metal door frames with metal clips, each with 2 screws into jamb stud.
 - e. Attach jamb studs to wood door frames with pairs of wood screws, spaced 24-inches on center.
5. Frame openings other than door openings in the same manner as for doors, and install framing below sills of openings to match framing required above door heads.
6. Frame both sides of expansion and control joints with a separate stud; do not bridge the joint with framing components.
7. Install continuous horizontal stiffeners in partitions where recommended by stud manufacturer for partition height, stud gauge, stud spacing, number of layers of gypsum board used, and anticipated stud deflection.
8. Stiffen openings with horizontal channels. Provide one channel continuous across head of openings extending to third stud beyond on each side. Provide one channel at each frame anchor extending to third stud beyond. Wire-tie or weld horizontal channels to each stud.

- C. Chase-Wall Framing:

1. Align two parallel rows of floor and ceiling runners according to partition layout.
 2. Position steel studs vertically in runners with flanges in same direction, with studs on opposite sides of chase directly across from each other. Anchor to runners in accordance with manufacturer's instructions.
 3. Cross brace chase studs with 12-inch wide gypsum wallboard gussets or minimum 2-1/2-inch steel studs. Attach web-to-web with screws. If chase wall studs are not opposite, brace with horizontal runners and braces.
- D. Wall Furring, Direct Attachment:
1. Attach hat-shaped metal furring channels either vertically or horizontally. For furring positioned horizontally, attach a furring member not more than 4-inches from both the floor and ceiling. Secure with fasteners placed on alternate channel flanges, spaced on 16-inch centers.
 2. Attach Z-shaped metal channels vertically, spaced 16-inches on center unless otherwise indicated, with fasteners spaced 24-inches on center.
- 3.4 BACKING PLATES
- A. Install as indicated and specified for support of wall-hung cabinets, toilet partitions and accessories, and other items to be mounted on vertical surfaces.
 - B. Welding shall comply with AWS D1.3.
 - C. Paint welds with a rust-inhibitive paint.
- 3.5 HORIZONTAL FRAMED SURFACES
- A. Joist frame with studs of size, gauge and spacing indicated or as determined from manufacturer's standard tables based on specified deflection criteria.
 - B. Provide runner channels to receive studs at ceiling and walls of same gauge as studs. Secure with mechanical fasteners at 24-inches on center maximum.
 - C. Secure studs to channels with screws.
 - D. Provide furring channels in resilient sound isolation clips as indicated.
- 3.6 SOUND CONTROL WORK
- A. Specified requirements apply to framing for interior partitions indicated as sound partitions.
 - B. Isolate top and bottom runners from direct contact with structure by installing over either:
 1. Continuous compression or isolation strips as specified, or
 2. Two continuous 1/4-inch beads of acoustical sealant specified in Section 07 92 19 applied at quarter points of track width.
 - C. Studs at terminal ends of partitions abutting intersecting walls or partitions, and studs that would otherwise contact intermediate structural columns shall be similarly installed over strips or sealant.
- 3.7 INSTALLATION TOLERANCES
- A. Variation from Plumb: Maximum 1/8-inch in 10-feet, non-cumulative.
 - B. Variation from Level: Maximum 1/8-inch in 10-feet, non-cumulative.
 - C. Variation from True Plane: Maximum 1/8-inch in 10-feet, non-cumulative.
 - D. Variation from True Position: Maximum 1/4-inch, non-cumulative.

E. Variation of Member from Plane: Maximum 1/8-inch, non-cumulative.

END OF SECTION

METAL LATH AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing metal lath and accessories.
- B. Related Sections:
 - 1. Gypsum sheathing is specified in Section 06 16 43.
 - 2. Fluid-applied weather-resistive air and moisture barrier membrane is specified in Section 07 27 00.
 - 3. Portland cement plaster is specified in Section 09 24 00.

1.2 SUBMITTALS

- A. General: Comply with the requirements in Division 01.
- B. Product Data: Furnish for each type of lath, fastener, and accessory specified.
- C. Shop Drawings: Include elevations of walls to receive portland cement plaster showing location of all control and expansion joints. Include detail showing horizontal and vertical intersections of control and expansion joints.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with the applicable requirements of California Building Code (CBC) Section 2507.2 and Table 2507.2.
- B. Industry Association Recommendations: Conform to recommendations of NAAM EMLA 920 – Guide Specifications for Metal Lathing and Furring except where those recommendations conflict with specified requirements.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with the requirements in Division 01.
- B. Deliver products and materials in original unopened packages, containers, or bundles with manufacturer's label intact and legible.
- C. Remove items delivered in broken, damaged, rusted, or unlabeled condition from Project site immediately.
- D. Protect metal lath and accessories from moisture and other sources of damage.
- E. Store metallic materials and accessories indoors, off the floor in a clean, dry location.

PART 2 - PRODUCTS

2.1 METAL LATH

- A. Metal Lath: ASTM C847, cold-rolled carbon steel sheet with ASTM A653 G60 (Z180) galvanized coating.
 - 1. Self-Furring Welded Wire Lath: Structa Wire Corp. "Structalath Twin Trac", ICC ESR-2017 or approved equal welded wire lath, 17-gauge galvanized steel wire welded to form 1-1/2-inch x 1-1/2-inch openings with secondary cold-rolled longitudinal wires.
 - a. Weight: 1.14-lb/sq. yd.

- b. Finish: Class 1 galvanized coating complying with ASTM A641.
- 2. Self-Furring Welded Wire Lath for Stud Spacing over 16-inches on center: Structa Wire Corp. "Megalath", ICC ESR-2017 or approved equal self-furring welded wire lath, 17-gauge x No. 16 galvanized steel wire welded to form 0.7-inch x 1.5-inch openings with five additional secondary cold-rolled longitudinal wires spaced every 6.5-inches..
 - a. Weight: 1.95-lb./sq. yd.
 - b. Finish: Class 1 galvanized coating complying with ASTM A641.
- 3. Ceiling Rib Lath: Structa Wire Corp. "V Truss Walls & Ceilings", ICC ESR-2017 or approved equal, 0.7-inch x 1-1/2-inch rectangular openings with flattened cold-rolled line wires spaced 3/4-inch apart, and heavy hole-punched kraft paper attached between primary wires and backing wires.
 - a. Weight: 2.2-lb/sq. yd.
 - b. Finish: Class 1 galvanized coating complying with ASTM A641.

2.2 FASTENERS

- A. General: Fasteners shall comply with ASTM C1063.
- B. Fasteners for Securing Metal Lath to Wood Framing:
 - 1. 1-1/2-inch roofing nails for horizontal applications and 1-inch roofing nails, 1-inch wide crown staples, or 6d common nails bent over to engage at least three strands of lath for vertical applications. Fasteners shall be of sufficient length to penetrate a minimum of 3/4-inch into stud.
 - 2. Staples or nails used to attach 3/8-inch rib lath shall penetrate horizontal framing members a minimum of 1-3/4-inch and vertical framing members a minimum of 3/4-inch. Nails shall be bent over the rib or the staple shall straddle the rib.
- C. Fasteners for Securing Metal Lath to Metal Framing:
 - 1. Corrosion-resistant screws complying with ASTM C1002 for attachment to metal framing 25-gauge and lighter framing and ASTM C954 for attachment to metal framing 20-gauge and heavier. Minimum head size shall be 7/16-inch with a pan or wafer head large enough to engage at least three strands of lath.
 - 2. Screws shall have a minimum #8 shank and shall penetrate the framing a minimum of 3/8-inch.
- D. Fasteners for Securing Metal Lath to Concrete or Concrete Block: Hardened concrete stub nails, minimum 3/4-inch long with minimum 3/8-inch heads, in rows not more than 16-inches on center with fasteners spaced a maximum of 7-inches on center along each row. Provide additional powder-actuated fasteners located at each corner and midway along the long edge of the sheet.
- E. Tie Wires: No. 16-gauge, galvanized, single strand annealed steel or No. 13-gauge, galvanized, double strand annealed steel.

2.3 METAL ACCESSORIES

- A. General: Comply with ASTM C1063, minimum 26-gauge galvanized steel or zinc alloy, perforated or expanded flanges. Galvanized surfaces to be field painted shall be bonderized. Coordinate depth of trim and accessories with plaster thickness and number of plaster coats required.
 - 1. Corner Beads: Small-nose type unless otherwise indicated.
 - 2. Casing Beads: No. 66 square edge.

3. Corner Reinforcement: Cornerite, minimum 1.75-pounds per square yard expanded metal lath with minimum 2-inch legs.
4. Strip Reinforcement: For reinforcing joints of dissimilar materials and diagonal reinforcement at opening corners, minimum 1.75-pounds per square yard expanded metal lath.
5. Expansion Joints:
 - a. Horizontal Joints: Cemco "M-Slide Expansion Joint", Stockton "MXS M-Slide Expansion Joint or approved equal.
 - b. Vertical Joints: Cemco "#40 Adjustable Expansion Joint (2-Piece)", Stockton "ECS Expansion Channel Screed" or approved equal.
6. Control Joints:
 - a. Horizontal Joints: Cemco "M-Slide Expansion Joint" or approved equal.
 - b. Vertical Joints: Cemco "Double V Control Joint (#15)" expanded flanges or approved equal.
7. Sill Screed: Cemco "#7 Foundation Sill Screed" or approved equal with weep holes.
8. Head at Doors and Windows: Cemco "#6 Drip Head Screed" or approved equal.
9. Soffit Drip Edge: Cemco "#5 Drip" or "#12 Soffit Drip Edge" or approved equal.
10. Ventilating Channel Screed: Fry Reglet Corp. No. PCS-75-V-75 or approved equal, extruded aluminum to be field painted.
11. Soffit Vent: Fry Reglet Corp. No. DS-875-V-150, Vinyl Corp. No. CSJ50-200V or approved equal.
12. Channel Screed: Fry Reglet Corp., Gordon or approved equal.

2.4 MISCELLANEOUS MATERIALS

- A. Rainscreen Drainage Mat: Benjamin Obdyke "Slicker Max Rainscreen 6 MM", Advanced Building Products, Inc. "Mortairvent 202", Stuc-O-Flex International, Inc. "WaterWay 3 mm" or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install materials in conformance with NAAM EMLA 920 and ASTM C1063, and as specified.
- B. Discontinue metal lath behind vertical control joints. Each control joint flange shall be supported by a separate stud.

3.2 INSTALLATION OF RAINSCREEN DRAINAGE MAT

- A. Install rainscreen drainage mat after windows are installed and flashed.
- B. Start at base of wall and roll out with flap down and matrix side against the WRB.
- C. On bottom course, fold the flap around the matrix and tuck against the WRB to prevent insect infiltration.
- D. Secure every 3-square feet with stainless steel or hot-dipped galvanized fasteners recommended by rainscreen manufacturer.
- E. Butt edges of new rolls and courses together without overlapping.

3.3 INSTALLATION OF METAL LATH

- A. Exterior Surfaces: Comply with CBC Table 2507.2.
1. Installation of self-furring metal lath shall comply with DSA IR 25-4.
 2. Attach to wood or metal framing or solid backing with specified fasteners spaced 6-inches apart. All fasteners shall penetrate the specified distance into framing.
 3. Where solid backing is not provided, apply with long dimension of sheets perpendicular to supports.
 4. Self-Furring Welded Wire Lath: Apply self-furring wire lath in accordance with manufacturer's instructions. Fasteners may attach at the furring crimps on the vertical cross wire, at the intersection of the longitudinal wire and cross wire or a point along the longitudinal wires.
 5. Ceiling Rib Lath: Install in accordance with manufacturer's instructions. Fasteners shall attach lath at framing supports at every second rib either at the furring crimps on the vertical cross wire, at the intersection of the longitudinal wire and cross wire or any point along longitudinal wire that is welded to the furring crimp. When using screws, deformation of the rib is preferable.
 6. Lap sides not less than 1/2-inch and ends not less than 1-inch. Lap wire fabric not less than one mesh at sides and ends or 1-inch, whichever is greater. Lap rib lath at sides by nesting outside ribs. Vertical laps shall occur at a structural support.
 7. Where two sheets of lath overlap horizontally between framing members, wire-tie laps between supports at intervals not exceeding 9-inches.
 8. Metal lath shall be continuous in corners.
 9. Insert lath as far as possible into reentrant space of metal frames, and notch to pass around jamb anchors.
 10. Where no external corner reinforcement is used, lath shall be furred out and carried around corners at least one support on frame construction.

3.4 INSTALLATION OF METAL ACCESSORIES

- A. General:
1. Install in accordance with ASTM C1063 and C1047 at locations indicated.
 2. Fasten in place as required to prevent dislodging or misalignment by subsequent operations. Use self-tapping screws on metal framing. Attach over required layers of building paper.
 3. Fasten at both ends and at a maximum of 12-inches on center along sides.
 4. Bring grounding edge of accessories to true lines, plumb, level, and straight.
 5. Install accessories to provide required depth of plaster and to bring plaster surface to required plane.
 6. Connect lengths of accessories as recommended by the manufacturer to assure a continuous line.
 7. Install continuous corner reinforcement for full length of external corners.
 8. Install casing beads to provide a minimum 1/8-inch clearance between structural units and termination points of surfaces to receive plaster finish.
 9. Where horizontal and vertical expansion or control joints intersect, vertical joints shall be continuous and uninterrupted.

10. Where location of control joints is not indicated, install control joints to create panels no larger than 144-square feet with no dimension exceeding 18-feet or a length-to-width ratio of 2-1/2-to-one. Miter intersections of vertical and horizontal joints. Joint locations not indicated shall be approved by the Architect.
11. Install sill weep screed as indicated. Terminate paper sheathing and lath on the attachment flange of the screed.

B. Beads:

1. Use single length of metal beads wherever length of run does not exceed longest standard stock length available; miter or cope corners.
2. Set beads level, plumb, and true to line. Shim as required and align joints with concealed splices or tie plates.
3. Provide casing beads at the following locations:
 - a. Where plaster abuts dissimilar construction.
 - b. At perimeter of openings where edges of plaster will not be concealed by other work.

END OF SECTION

SECTION 09 24 00

PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing the following type(s) of portland-cement plaster:
 - 1. Two-coat application over concrete or concrete block.
 - 2. Three-coat application over metal lath.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Metal lath and accessories are specified in Section 09 22 36.23.
 - 3. Painting is specified in Section 09 91 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's written recommendations, proportion mixes, and installation instructions for each product, including data showing compliance with specified requirements.
- C. Samples:
 - 1. For initial selection purposes, furnish manufacturer's color charts consisting of actual units or sections of units at least 12-inches square showing full range of colors, textures, and patterns available for each type of finish.
 - a. Where finish involves normal color and texture variations, include sample sets composed of two or more units showing full range of variations expected.
 - 2. For verification purposes, furnish units at least 12-inches square sets of each type of texture and color, showing full range of variations expected in the completed work.
- D. Certification from an independent Testing Agency that aggregates comply with specified requirements.

1.03 QUALITY ASSURANCE

- A. Code Requirements: Comply with applicable requirements of California Building Code (CBC) Chapter 25.
- B. Allowable Tolerances of Finished Surface: Maximum deviation from true plane shall not exceed 1/4-inch as measured from the line of a 10-foot straightedge placed at any location on the surface.
- C. Field-Constructed Mock-Up: Prior to plastering work, fabricate panels for each type of finish and application required to demonstrate aesthetic effects of application and qualities of materials and application.
 - 1. Locate mock-ups on site where directed by the Architect.
 - 2. Erect a 4-foot x 4-foot mock-up using materials and methods to be incorporated in the work.

3. Demonstrate range of aesthetic effects, including color, texture, and workmanship to be expected in the completed work.
4. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed plaster work.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver manufactured materials in original unopened packages or containers with manufacturer's label intact and legible.
- C. Keep cement and lime dry, stored off the ground, under cover, and away from damp surfaces.
- D. Remove wet and deteriorated materials from Project site.

1.05 JOB CONDITIONS

- A. General: comply with ASTM C926 requirements.
- B. Environmental Requirements:
 1. Provide sufficient heat and ventilation at enclosed areas where plastering is being performed to allow cement plaster to properly cure.
 2. Take precautionary measures necessary to ensure that excessive temperature changes do not occur.
 3. Cold Weather Requirements: Do not apply cement plaster unless minimum ambient temperature of 50-degrees F. has been and continues to be maintained for a minimum of 48-hours prior to application and until plaster is cured.
 4. Hot Weather Requirements: Protect cement plaster from uneven and excessive evaporation during hot, dry weather.
- C. Protection:
 1. Cover building openings in areas adjacent to plastering work with plastic film.
 2. Protect finished surfaces installed prior to plastering by covering with a suitable non-staining material. Cover metal frames with plastic film.
 3. Maintain protection in place until completion of plastering work.
- D. Pre-Application Conference: Prior to commencement of portland cement plastering, hold a pre-application conference at the Project site to discuss materials and procedures to be used. Conference shall be attended by the Architect, Contractor, Owner's Representative and plastering subcontractor.

PART 2 - PRODUCTS

2.01 BASE COAT MATERIALS

- A. General: Contractor shall have the option of using BMI Products 690 Plaster, ICC ESR-2535 or approved equal proprietary portland cement with plasticizing agents and admixtures, plastic cement, or a blended cement that meets ASTM C926 and CBC Chapter 25.
- B. Portland Cement: ASTM C150, Type I - II, low alkali.
- C. Plastic Cement: ASTM C150, Type I or Type II, with added plasticizers not exceeding 12-percent of total volume of cement. When used, volume of plastic cement shall not exceed 50-percent content in mix.
- D. Aggregates: ASTM C897.

1. Gradation, Base (Scratch and Brown) Coats:

U.S. Standard Sieve	Percent Retained by Weight (+2%)	
	Minimum	Maximum
No. 8 (2.35 mm)	0	10
No. 16 (1.18 mm)	10	40
No. 30 (600 um)	30	65
No. 50 (300 um)	70	90
No. 100 (150 um)	95	100

2. Independent Testing Agency shall sample aggregate on the Project site and test for compliance with specified ASTM C897 standard.

E. Fiber Reinforcing: 1/2-inch alkaline-resistant chopped-glass fibers or alkaline-resistant polypropylene fibers. Detergent admixtures or clay to aid in pumping plaster will not be permitted.

F. Water: Clean, potable, and free from substances harmful to plaster.

G. Admixtures:

1. Air Entraining Agent: ASTM C260.

2. Water-reducing Agent: ASTM C494, Type A.

3. Workability Enhancing Agent: Gibco PRF or approved equal lime replacement.

H. Bonding Agent: Type suitable for bonding cement plaster to concrete or concrete unit masonry surfaces; Sika "Liquid Weld", Omega Products International "Akroloc", "Polyloc" or "Bondcrete", Larsen Products Corp. "Weld-Crete Concrete Bonding Agent", Merlex "Superhold" or approved equal.

1. Bonding agent shall comply with CBC Section 2510.7.

2.02 FINISH COAT MATERIALS

A. Factory-prepared product containing all materials required for finish coat, except water; BMI Products, Omega Products International, Parex USA / La Habra, or approved equal; finish texture to match existing. Plaster will be field painted as specified in Section 09 91 00.

2.03 CEMENT PLASTER

A. Mixing:

1. General:

a. Accurately proportion materials for each plaster batch with measuring devices of known volume.

b. Size batches for complete use within maximum of one-hour after mixing.

c. Re-temper plaster stiffened from evaporation, but do not use or retemper partially hydrated cement plaster.

d. Do not use caked or lumping materials.

e. Mix factory-prepared plaster if used in accordance with the manufacturer's written instructions.

f. Use moist, loose sand in mix proportions.

g. Withhold 10-percent of mixing water until mixing is almost complete, then add as needed to produce necessary consistency.

2. Mechanical Mixing:

a. Clean mixer of set or hardened materials before loading for new batch.

- b. Maintain mixer in continuous operation while adding materials.
 - c. Conform to mixing sequence and time recommended by manufacturer of plaster materials. Add fibers by sprinkling in mix during last 2-minutes of mixing cycle.
3. Hand Mixing: Do not hand-mix unless authorized by Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that surfaces to be plastered are free of dust, loose particles, oil, and other foreign matter which would affect bond of plaster coats.
- B. Examine construction, grounds, and accessories to ensure that finished plaster surfaces will be true to line, level, and plumb, without requiring additional thickness of plaster.
- C. Do not commence installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Solid surfaces shall have the suction and surface roughness to provide the bond required for the plaster.
- B. Prepare smooth and nonabsorbent solid surfaces including cast-in-place concrete, precast concrete, or concrete masonry to receive portland cement plaster in accordance with CBC Section 2510.7.

3.03 APPLICATION

- A. General: Comply with ASTM C926 for applications indicated and specified.
- B. Number of Coats:
 - 1. Provide three-coat application over metal lath in accordance with ASTM C926.
 - 2. Provide two-coat application on concrete unit masonry, precast concrete, or cast-in-place concrete where indicated.
- C. Two-Coat Application:
 - 1. Apply plaster by hand or machine spray.
 - 2. Interrupt any plaster coat only at junctions of plaster planes, at openings, or at control joints.
 - 3. Apply base coat over bond-dash coat or bonding agent bringing out to grounds, flat to true surface, and free of imperfections which would reflect in finish coat; and score to assure bond with finish coat.
 - 4. Apply finish coat with sufficient material and pressure to ensure tight contact with and coverage of base coat.
 - 5. Nominal Plaster Thicknesses Measured from Face of Plaster Base:
 - a. Dash-Bond or Bonding Agent and Base Coat: 1/4-inch
 - b. Finish Coat: 1/8-inch
 - c. Total: 3/8-inch
- D. Three-Coat Application:

1. Apply plaster by hand or machine spray. If machine applied, use only experienced machine applicator. Slump for machine applied plaster shall be between 2-1/2- to 4-inches at mixer and 2- to 3-1/2-inches at nozzle.
2. Interrupt plaster coats only at junctions of plaster planes, at openings, or at control joints.
3. Apply scratch coat with sufficient material and pressure to form full keys through and to embed metal lath. When firm, score in one direction to provide bond with brown coat.
4. Apply brown coat to scratch coat, bringing out to grounds, flat to true surface, and free of imperfections which would reflect in finish coat. Reconsolidate brown coat by floating, and roughen to assure bond with finish coat.
5. Double-back method of application of scratch and brown coat is acceptable providing specified thickness is maintained.
6. Apply finish coat in accordance with manufacturer's instructions and uniformly float to true, even surface.
7. Nominal Plaster Thickness Measured from Face of Lath, in accordance with ASTM C929, Table 4:
 - a. Scratch Coat: 3/8-inch, minimum.
 - b. Brown Coat: 3/8-inch.
 - c. Finish Coat: 1/8-inch, minimum.

F. Curing:

1. Maintain moist conditions by fine fog spraying.
2. Cure scratch coat for a minimum of 48-hours, and maintain a minimum of 48-hours between application of scratch coat and brown coat.
3. Cure brown coat for a minimum of 48-hours, and maintain a minimum of 7-days between the application of the brown coat and finish coat.

3.04 COMPLETION

A. Patching:

1. Upon completion of application, point up plaster around trim and other locations where plaster meets dissimilar materials.
2. Cut out and patch defective or damaged plaster.
3. Match patching of defective or damaged plaster to existing work in form, texture, and color.

B. Cleaning:

1. Remove plaster and protective materials from control and expansion joints, perimeter beads, and adjacent surfaces.
2. Remove stains that would adversely affect subsequent finishes on plaster.

C. When complete, plaster surfaces shall be flat or uniformly curved, true to plane; and free from scaffold and tool marks, stains, or other damage or defects and shall be uniform in color and texture.

3.05 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 09 28 13

CEMENTITIOUS BACKING BOARDS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section includes cementitious backing boards. Extent of cementitious backing boards includes:
 - 1. Backing board for tiled walls.
 - 2. Setting materials for installation of tile backer boards.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Elastomeric liquid waterproofing is specified in Section 07 14 16.
 - 3. Non-structural metal framing is specified in Section 09 22 16.
 - 4. Gypsum board is specified in Section 09 29 00.
 - 5. Tile is specified in Section 09 30 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's data for each type of component and system specified, including performance ratings, details of construction, materials, and installation instructions.

1.03 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver materials in their original unopened packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- C. Store materials under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes. Neatly stack cementitious backing board to prevent sagging; stack flat, on continuous surface, and without skids.
- D. Handle cementitious backing boards to prevent damage to edges, ends or surfaces. Remove damaged or deteriorated materials from site.

1.04 PROJECT CONDITIONS

- A. Cold Weather Protection: In cold weather, maintain continuous, uniform, building temperatures of not less than 45-deg F. or more than 100-deg. F. for a minimum period of 48-hours prior to, during, and following cementitious backing board and tile installation.
- B. Conditioning: Store cementitious backing board in spaces where it is to be installed for 48-hours prior to installation. Do not install board when it is wet.
- C. Ventilation: Ventilate building spaces as required to remove excess moisture.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURER

- A. United States Gypsum Company "DUROCK Brand Cement Board" or approved equal.

2.02 MATERIALS

- A. Cementitious Backing Board: Aggregated portland cement board with vinyl-coated, woven glass-fiber mesh embedded in back and front surfaces.
 - 1. Thickness: As indicated.
 - 2. Faces: Smooth on one side, textured on other side.
 - 3. Edges: Formed smooth edges; square cut ends.
 - 4. Weight: 3-pounds per square foot.
 - 5. Flexural Strength: 750-psi minimum per ASTM C 947.
 - 6. Compressive Strength: 2300-psi minimum with 1-inch diameter disk per ASTM D2394.
 - 7. Nail Pull Resistance: 125-lbs. minimum per ASTM C473.
 - 8. Flame Spread, Smoke Developed: 5, 0 respectively, in accordance with ASTM E84.
- B. Joint Reinforcement: Glass-fiber tape, vinyl coated, open-weave tape; 2-inches wide; pressure-sensitive.
- C. Fasteners: Self-drilling screws with corrosion resistant finish.
 - 1. At Cementitious Backing Board: Screws with flat wafer head capable of being driven flush to surface of tile backer board; 1- 1/4-inch long.
 - 2. When cementitious backing board is installed over gypsum board base layer, screws shall be 1-5/8-inches long.
- D. Water Barrier: Vapor permeable membrane, 15 lb. asphalt felt or TYVEK building paper by E.I. du Pont de Nemours & Company.
- E. Setting Materials:
 - 1. Latex-Portland Cement Mortar: ANSI A118.4.
- F. Joint Compound: Setting type or Lightweight Setting Type Joint Compound.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and framing for compliance with requirements and conditions affecting work of this Section. Do not proceed with installation until piping, waterproofing, and other in-wall work has been installed and accepted by Architect and unsatisfactory conditions have been corrected.
- B. Examine adjacent construction for conditions which could contribute to loss of sound attenuation.

3.02 GENERAL

- A. Comply with manufacturer's printed installation instructions applicable to products and applications indicated, except when more stringent requirements apply.
- B. Before installation, cut cementitious backing backer boards to required sizes, make necessary cut-outs for penetrations, and grind or drill to provide relief at bolts and screw heads which project beyond face of substrate.
- C. Control Joints: Do not install cementitious backing board continuously through building movement and control joints or where control joints are required in ceramic tile.

3.03 PARTITIONS

- A. Framing: Install cementitious backing board over framing type indicated. Install blocking to support tub and other plumbing fixtures, and to receive soap dishes, grab bars, towel racks and other accessories and hardware.
- B. Water Barrier: Where indicated, install over framing prior to application of cementitious backing boards. Lap joints to shed water towards face of partition.
- C. Apply cementitious backing boards to framing with long dimension parallel to or across framing. Fit ends and edges closely but not forced together. Center end or edge joints on framing and stagger joints in adjacent rows.
- D. Fasten cementitious backing board to framing. Locate screws at least 3/8-inch from edge of board and spaced not more than 8-inches o.c.

3.04 JOINT TREATMENT

- A. Tiled Surfaces: Apply joint reinforcing over joints and corners. Embed with mortar or adhesive used to set tile.
- B. Un-Tiled Exposed or Painted Surfaces: Install cementitious backing board with smooth side exposed. Seal cementitious backing board with sealer. Apply tape over joints. Embed joint tape and treat fasteners with joint compound. Flat trowel a skim coat of joint compound over cementitious backing board to fill voids. Sand to provide a smooth surface except where a textured finish is indicated. Finish joints with at least two coats of finishing compound. Install corner beads at outside corners.

3.05 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing the following:
 - 1. Gypsum board and associated accessories.
- B. Related Sections:
 - 1. Construction waste management is specified in Section 01 50 13.
 - 2. Gypsum sheathing is specified in Section 06 16 43.
 - 3. Firestopping is specified in Section 07 84 00.
 - 4. Acoustical joint sealants are specified in Section 07 92 19.
 - 5. Non-structural metal framing is specified in Section 09 22 16.
 - 6. Metal suspension systems are specified in Section 09 22 36.23.
 - 7. Acoustic insulation is specified in Section 09 81 00.
 - 8. Painting is specified in Section 09 91 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's specifications and installation instructions for each type of gypsum board and accessory required.
- C. Shop Drawings: Furnish layout drawing showing proposed location of control joints.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Gypsum board, including accessories and fasteners, shall be the products of the same manufacturer.
- B. Gypsum board work shall comply with ASTM C840 and California Building Code (CBC) Section 2508 unless otherwise indicated or specified.
- C. Installation and finishing of gypsum board shall comply with GA-216. Installation of fire-rated gypsum board shall comply with their listing descriptions indicated on the Drawings.
- D. Fire-Resistance Ratings: Where gypsum board systems with fire-resistance ratings are indicated, provide materials and installations identical with those of applicable assemblies tested in accordance with ASTM E119 by fire testing laboratories acceptable to authorities having jurisdiction.
 - 1. Provide fire-resistance-rated assemblies identical to those indicated by reference to GA File No's. in GA-600 "Fire Resistance Design Manual" or to design designations in UL "Fire Resistance Directory" or in listing of other testing and agencies acceptable to authorities having jurisdiction.
- E. Allowable Tolerances:
 - 1. Gypsum board surfaces shall have no measurable variation in any 2-foot direction and a maximum variation of 1/8-inch in 10-feet when a straightedge is laid on the surface in any direction. Specified tolerances apply to both plumbness of walls and levelness of ceilings.

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2. Shim work as required to comply with specified tolerances.
 3. Do not exceed 1/16-inch offset between planes of abutting sheets at edges or ends.
- F. Mock-up: Install mock-up using approved gypsum products, including fasteners and related accessories, in accordance with manufacturer's instructions and recommendations.
1. Size: 100-square feet.
 2. Prepare mock-up for each level of exposed gypsum board finish.
 3. Approved mock-up may remain as part of the work.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Delivery:
1. Deliver materials to the Project site in original package containers or bundles with manufacturer's labels intact and legible.
 2. Deliver fire-rated materials bearing the testing agency's label and classification identification.
- C. Storage:
1. Store materials indoors in a dry area, under cover, and stacked flat off the floor.
 2. Stack gypsum boards so that long lengths are not over short lengths.
- D. Handle gypsum board to avoid damaging face and edges of sheets.
- E. Protect metal corner beads and trim from being bent or damaged.

1.05 PROJECT CONDITIONS

- A. Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C840 and with gypsum board manufacturer's recommendations.
- B. Minimum Room Temperatures: For non-adhesive attachment of gypsum board to framing, maintain not less than 40-deg. F. For adhesive attachment and finishing of gypsum board, maintain not less than 50-deg. F. for 48-hours prior to application and continuously thereafter until drying is complete.
- C. Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.
- D. Provide for continuous ventilation during installation, using as close to 100-percent outside air as possible.
- E. Protect workers and HVAC system from gypsum dust.
- F. Remove and replace all gypsum board products that are exposed to water and display mold and mildew. Removal shall occur as soon as possible after exposure to water.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. United States Gypsum, Domtar, Inc., Georgia Pacific, National Gypsum Company or approved equal.

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- A. Gypsum Board: United States Gypsum “SHEETROCK SW” or approved equal with tapered rounded edge to minimize ridging or heading and other joint imperfections.
1. Typical: ASTM C1396, Type X fire-resistance, impact resistance type is indicated or required to meet UL assembly types.
 2. Thickness: 5/8-inch.
 3. Provide Firecode C core panels where required for fire-rated assemblies in Gypsum Association Fire Resistance Design Manual.
- B. Mold- and Moisture-Resistant Gypsum Board: United States Gypsum “SHEETROCK Mold Tough” or approved equal noncombustible, moisture- and mold-resistant gypsum core encased in moisture- and mold-resistant, 100-percent recycled face and back papers. Panels shall have a tapered long edge.
1. ASTM C1396, regular type except where Type X fire-resistant type is indicated or required to meet UL assembly types.
 2. Thickness: 5/8-inch.
 3. Provide Firecode C core panels where required for fire-rated assemblies in Gypsum Association Fire Resistance Design Manual.

2.03 GYPSUM BOARD ACCESSORIES

- A. Screws: ASTM C954 or ASTM C1002.
1. Use Type S screws for gypsum board attachment to light steel framing.
 2. Use Type S-12 screws for gypsum board attachment to 20-gauge and heavier steel framing.
 3. Use Type G screws for gypsum board attachment to gypsum board.
 4. Use Type W screws for gypsum board attachment to wood framing.
- B. Metal Trim: Galvanized steel, 26-gauge minimum; profiles and dimensions indicated.
1. Corner Beads: United States Gypsum “Dur-A-Bead” or approved equal.
 2. Casing Beads: United States Gypsum or approved equal.
 3. Control Joints: Roll-formed zinc with perforated flanges, 1-3/4-inch wide with 1/4-inch wide center channel with removable tape strip over channel.
- C. Reveals: Extruded aluminum alloy 6063-T5, profiles indicated, finish as selected by the Architect.
- D. Joint-Treatment Materials: ASTM C475.
1. Drying-type (ready mixed): United States Gypsum “SHEETROCK” all-purpose joint compound or approved equal.
 2. Setting-type (chemically hardening): United States Gypsum “SHEETROCK” setting-type joint compound or approved equal.
 3. Low-Dust Emission Type: United States Gypsum “SHEETROCK” Plus 3 ready-mixed lightweight all purpose joint compound with dust control or approved equal.
- E. Reinforcing Joint Tape: ASTM C475, 2-inch nominal width.
- F. Acoustical Sheet Sealant Pad: Harry A. Lowry & Associates, 3M or approved equal.
- G. Resilient Channels: Unimast “RC Deluxe”, Cemco “RC-1”, Dale/Incor RFC-1”, Dietrich “RCSN” or approved equal.

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- H. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- I. Primer/Surfacer: United States Gypsum "SHEETROCK" Tuff-Hide" primer-surfacer or approved equal.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that conditions are satisfactory for the installation of gypsum board and accessories.
 - 1. Check framing for accurate spacing, alignment, plumbness, and levelness. Verify that both new and existing framing members will result in gypsum board surfaces complying with specified tolerances.
 - 2. Verify spacing of installed framing does not exceed maximum allowable for thickness of board to be used.
 - 3. Verify door frames are set for thickness of board to be used.
 - 4. Repair protrusions of framing, twisted framing members, or unaligned members before installation of gypsum board commences.
- B. Do not commence the installation until unsatisfactory conditions have been corrected.

3.02 APPLICATION OF GYPSUM BOARD

- A. Apply materials in conformance with ASTM C840, the manufacturer's instructions, and as indicated.
- B. When gypsum board is to be applied to both walls and ceilings, apply to ceilings first.
- C. Resilient Framing:
 - 1. Partitions: Apply resilient channels at right angles to framing. Position bottom channel with resilient channel attachment flange either up or down; position other channels with resilient channel attachment flanges down. Attach with 1-1/4-inch screws. Locate resilient channels 2-inches from floor, within 6-inches of ceiling, and not more than 24-inches on center.
 - 2. Ceilings: Apply resilient channels at right angles to framing. Attach with 1-1/4-inch screws driven through channel attachment flange. For fire-rated, double-layer assembly, apply channels over base layer and attach with 1-7/8-inch screws driven through channel flange and base layer into joist. Fasten channels to joists at each intersection.
- D. For partitions, apply full height sheets with long dimension parallel to framing members with abutting edges over supports. Where ceiling heights exceed 10'-0" and where required by fire resistive ratings, apply sheets with long dimension perpendicular to framing members. For ceilings, apply sheets with long dimension either perpendicular or parallel to framing members to result in fewest joints. For fire-rated assemblies, apply gypsum board in accordance with CBC Chapter 7.
- E. Use sheets of maximum lengths to minimize end joints.
- F. Neatly fit and stagger end joints.
- G. Locate joints on different studs at opposite sides of partition.
- H. Cut and fit neatly around outlets and switches. Back-to-back wall penetrations shall be at least two stud spaces apart for acoustic isolation.
- I. Double-Layer Application:

1. Apply base layer with long dimension perpendicular to and centered on framing; apply face layer parallel to framing. Apply base layer parallel to framing where required by fire-resistive ratings.
 2. Stagger sheets of each layer so that joints of each layer are 16-inches apart.
- J. Isolation of Gypsum Board from Other Construction:
1. Provide perimeter relief where gypsum board abuts structural decks, ceilings, vertical structural elements, or window sections.
 2. Finish gypsum board edge with corner bead.
 3. Seal space between casing bead and structure with continuous sealant bead.
 4. Seal around electrical boxes and conduit and pipe penetrations.
 5. Seal at base of gypsum board sheets.
- K. Acoustic Control Requirements for Sound Walls:
1. Leave a 1/8- to 1/4-inch space between gypsum board and adjacent construction to provide a space for acoustical sealant.
 2. Seal airtight with acoustical sealant material specified in Section 07 92 19.
 3. Seal penetrations through walls, or cuts in one face of walls, with a full bead of sealant at perimeter; this includes provisions for electrical outlet and switch boxes, pipes, ducts, and similar items.
 4. Seal electrical boxes at the back with specified sheet sealant pad. Where wires enter the boxes, seal the openings airtight around the wires and knockout openings.
 5. Install mild steel sleeves where required, fiberglass packing between sleeve or framing, service and cover plates. Seal on both sides to render airtight.
 6. Tolerance: 1/8-inch between wall boarding and sleeve, 3/8- to 5/8-inch between sleeve and service.
- L. Installation of Fasteners:
1. Do not locate fasteners less than 3/8-inch from edges or ends of sheets. Do not locate fasteners less than one-inch from edges or ends in horizontal applications.
 2. Fire-Rated Partitions: Install fasteners in accordance with the more restrictive of either CBC Chapter 7 or the Underwriters' Laboratories assemblies as denoted on partition schedule.
 3. Non-Fire-Rated Partitions: Install fasteners in accordance with GA-216 and ASTM C840.
 4. Fire-Rated Ceilings: Install fasteners in accordance with CBC Chapter 7.
 5. Non-Fire-Rated Ceilings: Install fasteners spaced not more than 12-inches on center.
 6. Install screws using powered screw guns with adjustable screw-depth control head. Drive shank perpendicular to gypsum board surface. Do not hammer screws.
 7. Set fastener heads slightly below surface of gypsum board, but do not break or strip paper face around fastener.
 8. Stagger fasteners opposite each other on adjacent ends and edges.
 9. Omit fasteners at edges where metal edge trim will be installed.

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M. Installation of Accessories:

1. Install corner trim at vertical and horizontal external corners and angles, and edge trim at junctions of gypsum board and other materials and at exposed edges.
2. Control Joints:
 - a. Ceilings: Maximum area for ceilings with perimeter relief shall be 2,500-sq. ft.; maximum area for ceilings without perimeter relief shall be 900-sq. ft. Do not exceed 50-feet between control joints in ceilings with perimeter relief; 30-feet between control joints in ceilings without perimeter relief.
 - b. Walls and Partitions: Maximum spacing between control joints shall not exceed 30-feet.
 - c. Control joint locations shall occur only where indicated on reviewed layout drawings.

3.03 TAPING AND FINISHING

A. Finish Levels: Provide levels of gypsum board finish for locations as follows, in accordance with Gypsum Association GA 214 "Recommended Specification: Levels of Gypsum Board Finish".

1. Level 0: In areas of temporary construction, no taping or accessories are required.
2. Level 1: Ceiling plenum areas and concealed areas. Provide higher level of finish as required to comply with fire-resistance ratings and acoustical ratings.
3. Level 2: Not used.
4. Level 3: Not used.
5. Level 4: Gypsum board surfaces, except where another finish level is specified.
6. Level 5: Not used.

B. Interior Gypsum Board Finishing:

1. Taping (Level 1):
 - a. Use taping or all purpose compound.
 - b. Butter taping compound into inside corners and joints.
 - c. Center tape over joints and press down into fresh compound.
 - d. Remove excess compound. Tape joints of gypsum board above suspended ceilings.
2. First Coat (Level 2):
 - a. Use taping or all-purpose drying-type compound or setting-type joint compound.
 - b. Immediately after bedding tape, apply skim coat of compound over body of tape and allow to dry completely in accordance with manufacturer's instructions.
 - c. Apply first coat of compound over flanges of trim and accessories, and over exposed fastener heads and finish level with board surface.
3. Second Coat (Level 3):
 - a. Use all purpose or topping drying type joint compound.

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- b. After first coat treatments is dried, apply second coat of compound over tape and trim, feathering compound 2-inches beyond edge of first coat.
 - 4. Third Coat (Level 4):
 - a. Use all purpose or topping drying type joint compound.
 - b. After second coat has dried, sand surface lightly and apply thin finish coat to joints, fasteners and trim, feathering compound 2-inches beyond edge of second coat.
 - c. Allow third coat to dry. Apply additional compound, and touch-up and sand, to provide surface free of visual defects, tool marks, and ridges, ready for application of finish.
 - C. Cut edges and openings around pipes and fixtures shall be caulked flush with sanitary sealant as specified in Section 07 92 00.
 - D. In the completed installation, gypsum board shall have plumb and straight surfaces with no waves or buckles. Joints, fastener heads, and trim flanges shall be invisible after finishing. Surfaces shall be uniformly smooth and ready for painting or other decoration.
 - E. Primer/Surfacers: Complete gypsum board surface to Level 4 before applying primer-surfacer. Machine-apply with airless sprayer in conformance with manufacturer's instructions to a wet film thickness of 15- to 20-mils. Allow to dry overnight before painting.
- 3.04 PROTECTION OF FINISHED WORK
 - A. Maintain temperature and humidity conditions as required to protect the installation.
 - B. Protect completed gypsum board from damage or deterioration until final acceptance of the work.
- 3.05 CONSTRUCTION WASTE MANAGEMENT
 - A. General: Comply with Section 01 50 13.
 - B. Separate clean waste gypsum products from contaminants for recycling. Do not include wood, plastic, metal, asphalt impregnated gypsum board or any gypsum board coated with glass fiber vinyl, decorative paper, paint or other finish. Place in designated area and protect from moisture and contamination. Protect scraps and pulverized material from moisture and contamination.
 - C. Clean, unpainted waste gypsum products may be recycled by:
 - 1. Returning to gypsum board manufacturer in lieu of landfill.
 - 2. Hauling to alternative use manufacturer in lieu of landfill.
 - D. Separate metal waste and place in designated areas for recycling or reuse.

END OF SECTION

SECTION 09 30 00

TILE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing the following:
 - 1. Wall tile.
- B. Related Sections:
 - 1. Construction waste management and disposal are specified in Section 01 50 13.
 - 2. Elastomeric liquid waterproofing is specified in Section 07 14 16.
 - 3. Joint sealants are specified in Section 07 92 00.
 - 4. Cementitious backing board is specified in Section 09 28 13.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Furnish manufacturer's product data for each specified product.
- C. Shop Drawings: Show tile patterns and locations and widths of expansion, contraction, and isolation joints in tile substrates and finished tile surfaces.
- D. Samples for Initial Selection: If colors have not been preselected, furnish manufacturer's color charts consisting of actual tiles or sections of tile showing full range of colors, textures, and patterns available for each type of tile. Include samples of grout and accessories involving a color selection.
- E. Samples for Verification: Furnish samples of the following items. Where products involve color and texture variations, furnish sets showing full range of variations expected.
 - 1. Each type and composition of tile for each color and texture required, at least 12-inches square, mounted on plywood or hardboard backing and grouted.
 - 2. Full-size units of each type of trim and accessory for each color required.
- F. Warranty.

1.03 QUALITY ASSURANCE

- A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, and variety of tile from a single source with resources to provide products of consistent quality in appearance without delaying progress of the work.
- B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate. Manufacturer of setting and grouting products shall be the same as that of the elastomeric liquid waterproofing specified in Section 07 14 16.
- C. Installer's Qualifications: A minimum of 3-years' experience installing ceramic tile of the types specified, and a minimum of 5 installations of a magnitude similar to or larger than the work of this Section.

- D. Field-Constructed Mock-Up: Before installing tile, erect mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and installation. Build mock-ups using materials to be used in the final work.
 - 1. Locate on site in a location and size as directed by the Architect.
 - 2. Obtain Architect's acceptance before start of final work.
 - 3. Retain and maintain during construction in undisturbed condition as a standard for judging completed work.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with ANSI A137.1 for labeling sealed tile packages.
- C. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.05 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Install mortar, set and grout tile when surfaces and ambient temperature is minimum 50-deg. F. and maximum 90-deg. F.
- C. Protect adjacent work surfaces during tile work. Close rooms or spaces to traffic of all types until mortar and grout has set.
- D. Observe manufacturer's safety instructions including those pertaining to ventilation.

1.06 EXTRA MATERIALS

- A. Furnish additional tile for replacement and maintenance, at the rate of approximately 5-percent, to the nearest full carton, for each size, color, pattern, and type installed. Identify each carton as to contents.

1.07 WARRANTY

- A. Warrant tile and installation to be free from defects in materials and workmanship for a period of 25-years from date of Substantial Completion. This warranty is in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 TILE MATERIALS

- A. Wall Tile: Heath Ceramics Diamond Dimensional Tile (M63 Fog glaze)
- B. Base: As indicated in the Finish Legend on the Drawings.
- C. Trim Units: Provide trim units to match adjoining flat tile.
 - 1. Size: Coordinate with sizes and coursing of adjoining flat tile.
 - 2. Shapes: As indicated.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected, blend tile in the factory and package so tile taken from one package shows the same range of colors as those taken from other packages.

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2.02 SETTING MATERIALS

A. Mortar:

1. Polymer-Enhanced Thin-Set Mortar: ANSI A108.5 or A108.12 with shear bond strength greater than 650-psi per ANSI A118.4 Section 5.2.4.
 - a. Mortar shall be by the same manufacturer and approved for use in thin-setting ceramic tile over elastomeric liquid waterproofing specified in Section 07 14 16.

2.03 GROUTING MATERIALS

- A. General: Grouting materials shall be by the same manufacturer as the tile setting materials.
- B. Commercial Portland Cement Grout: ANSI A118.6, color as indicated in the Finish Legend on the Drawings.
- C. Dry-Set Grout: ANSI A118.6, color as indicated in the Finish Legend on the Drawings.
- D. Latex-Portland Cement Grout: ANSI A118.6, color as indicated in the Finish Legend on the Drawings.
- E. Chemical-Resistant Epoxy Grout: ANSI A118.3, color as indicated in the Finish Legend on the Drawings.
- F. Grout Schedule:
 1. Wall Tile: Commercial portland cement, dry-set, or latex-portland cement.

2.04 MISCELLANEOUS MATERIALS

- A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8-inch wide at top edge with integral provision for anchorage to mortar bed or substrate.
- B. Sealer: As recommended by tile and grout manufacturers. Sealer shall comply with specified VOC limits.
- C. Elastomeric Sealant: As specified in Section 07 92 00. Sealant at tile shall be by the same manufacturer as the grout.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine substrates and areas where tile will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
 2. 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 before installing tile.

3.02 PREPARATION

- A. Blending: For tile exhibiting color variations within the range selected, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in 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.
- B. Surface Preparation:

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1. General:
 - a. Supporting surfaces shall be structurally sound, solid, stable, level, plumb, and true to a tolerance in plane of 1/4-inch in 10-feet for walls when tile is thin-set. When installing large format tile (one side greater than 15-inches), the tolerance is reduced to 1/8-inch in 10-feet.
 - b. Supporting surfaces shall be clean and free of dust, oil, grease, paint, tar, wax, curing compound, primer, sealer, form release agents, laitance, loosely bonded topping, loose particles or any deleterious substances and debris which may prevent or reduce adhesion.
 - c. Mechanically sand and scarify the substrate to completely remove all paint, loosely bonded topping, loose particles and construction debris.
 - d. Neutralize any trace of strong acid or alkali.
 - e. Substrates shall be dry. The moisture content shall not exceed 50-percent.
 - f. Turn off forced ventilation and protect work against drafts during installation and for a period of at least 72-hours after completion. Use indirect auxiliary heaters to maintain the temperatures in the area at the recommended workable level. Vent temporary heaters to the exterior to prevent damage to tile work from carbon dioxide build-up.
 - g. Do not proceed with work until surfaces and conditions comply with the requirements of ANSI A10-8 standards.

C. Wall Surfaces: Comply with ANSI A108.01 Section 2.4.

D. Condition of Surface to Receive Tile:

1. Assure that surfaces to receive tile are stable, flat, firm, dry, clean and free of oil, waxes and curing compounds.
2. Deflection of substrates shall not exceed 1/360 of the span, 1/2-inch in 15-feet in accordance with ANSI A108.01 Section 2.3. Allow for live and impact load as well as dead load weight of tile and setting bed.
3. Protect adjacent surfaces prior to beginning tile work.

3.03 INSTALLATION, GENERAL

- A. General: Install tile materials in accordance with tile manufacturer's instructions and recommendations. Provide additional tile setting materials, including but not limited to crack isolation membrane, where recommended by tile manufacturer.
- B. ANSI Tile Installation Standard: Comply with referenced parts of ANSI 108 series of tile installation standards.
- C. TCNA Installation Guidelines: Comply with TCNA "Handbook for Ceramic Tile Installation" installation methods referenced.
- D. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- E. 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 that plates, collars or covers overlap tile.

- F. Jointing Pattern: Unless otherwise indicated, lay tile in grid pattern. Align joints when adjoining tiles on base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.
- G. Lay out tile wainscots to next full tile beyond dimensions indicated.
- H. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
 - 2. Prepare joints and apply sealants as specified in Section 07 92 00.

3.04 TILE INSTALLATION METHODS

- A. Exterior Walls:
 - 1. Thin-set over Concrete: Thin-set over concrete substrate in accordance with ANSI A108.5 using TCNA Method W20E-20.
 - 2. With use of cementitious bond coat: when a waterproofing membrane is used -ANSI A118.15 or better or ISO C2S1 or better
- B. Movement Joints: Comply with TCNA Method EJ171. Proposed joint locations shall be approved by the Architect.
 - 1. Interior: Provide expansion joints at 24- to 36-feet on center in both directions, over cold joints and saw-cut control joints, and where tile abuts restraining surfaces. Joint spacing for tile exposed to direct sunlight or moisture shall be 12-to 16-feet on center. Joint width for paver tile shall be minimum 1/4-inch wide; ceramic mosaic tile and glazed wall tile shall be minimum 1/8-inch.
 - 2. Sealant Materials: As specified in Section 07 92 00.

3.05 CLEANING

- A. Upon completion of placement and grouting, clean tile surfaces so they are free of foreign matter.
 - 1. Remove latex-portland cement grout residue from tile as soon as possible.
 - 2. Do not use acid or acid cleaners to clean tile.
- B. Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

3.06 CURING

- A. Damp cure tile installations, including portland cement grouts, for a minimum of 72-hours.
 - 1. Cover with clean non-staining kraft paper.
 - 2. Do not use polyethylene sheets directly over tile on horizontal surfaces.

3.07 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer to ensure tile is without damage or deterioration at time of Substantial Completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
- B. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.
- C. Apply sealer to portland cement grout installations in accordance with sealer manufacturer's recommendations. Apply to small test area and obtain Architect's approval before proceeding with application over large areas.

3.08 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13.
- B. Separate waste in accordance with the Waste Management Plan and place in designated areas in the following categories for recycling:
 1. 1/2 tiles and larger, set aside for reuse by Owner, non-profit organizations such as Habitat for Humanity, etc.
 2. Broken tile and cut offs smaller than 1/2 tile, excess mortar and grout, crush for use as mosaic, sub-base or fill.
 3. Separate metal waste and place in designated areas for recycling or reuse.
 4. Separate cardboard waste and place in designated areas for recycling.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for the materials and installation of acoustical ceiling panels.
- B. Related Sections:
 - 1. Construction waste management is specified in Section 01 50 13.
 - 2. Metal acoustical ceiling suspension assemblies are specified in Section 09 53 23.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Manufacturer's descriptive and technical data and illustrations. Include MSDS data sheets.
- C. Material Samples: Duplicate sets of full-size panels for each type and size of acoustical unit required.
- D. Warranty.

1.03 EXTRA MATERIALS

- A. In addition to acoustical panels for completing installations required, furnish additional units, in typical field sizes, for each type of unit used in the work.
- B. Furnish quantities equal to not less than 5-percent of total installed area of each type of unit or greater to result in full carton lots for each type, except not less than ten full cartons for any one type of unit.
- C. Supply extra units from production lots or color runs the same as for units used in the work, and supply in cartons as factory packaged and labeled. Also identify cartons with Project name and type of ceiling panel.
- D. Deliver materials to project premises just prior to substantial completion, and store at location as directed.

1.04 WARRANTY

- A. Warrant acoustical ceiling panels to be free from visible sag and against mold, mildew and bacteria for a period of 30-years from Date of Substantial Completion. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 ACOUSTICAL CEILING PANELS

- A. Armstrong 2821 Calla
 - a. 24" x 48"
 - b. Square Lay-in
 - c. White

PART 3 - EXECUTION

3.01 AMBIENT CONDITIONS

- A. Building shall have been entirely enclosed and heated not less than 10-days before start of suspended-ceiling work.
- B. Before installation, acoustical units shall have been stored within the spaces where they are to be used for not less than 3-days, and with cartons opened and stripped sufficiently to permit units to stabilize to ambient conditions.
- C. Remove and replace all acoustical panel ceiling products that are exposed to water and display mold and mildew. Removal shall occur as soon as possible after exposure to water.

3.02 INSTALLATION

- A. Install acoustical panels in suspended grid system in accordance with manufacturer's instructions.
- B. Field-cut edges of tegular edge acoustical panels shall be routed to match the edge profile of uncut panels so that panels lay in grid system flush with adjacent un-cut panels and edges of cut panels match the appearance of uncut panels.
- C. Touch-up edges to match factory cut panels.

3.03 COMPLETION

- A. Acoustical panels shall rest uniformly on their supporting members and shall be flat and free from twist and warp.
- B. Exposed surfaces of acoustical units shall be clean and free from scratches, dents, tool marks, stains, discoloration, fingerprints, and other defects and damage.

3.04 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13.
- B. Separate waste and place in designated areas in the following categories for recycling:
 - 1. 1/2 panels and larger, set aside for reuse by Owner, non-profit organizations such as Habitat for Humanity, etc.
 - 2. Place scrap panels in designated areas for recycling or reuse.
 - 3. Separate cardboard waste and place in designated areas for recycling.

END OF SECTION

SECTION 09 53 23

METAL ACOUSTICAL CEILING SUSPENSION ASSEMBLIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for the materials and installation of acoustical suspension systems for acoustical panels.
- B. Work under this Section includes furnishing and installing safety hanger wires for mechanical and electrical equipment to extent specified. Connecting safety wires to such equipment is not included.
- C. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Acoustical ceiling panels are specified in Section 09 51 13.
 - 3. Electrical work is specified in Division 26.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Shop Drawings:
 - 1. Indicate ceiling-system layouts and general and atypical conditions and details.
 - 2. Include details of bracing, special features and joints, perimeters, relationship to adjacent construction, and anchorage and connections to structures.
- C. Product Data: Manufacturer's descriptive and technical data and illustrations, marked to identify product materials, types, and variations.
- D. Material Samples: Duplicate sets of 10-inch-long pieces of grid system and perimeter trim members with one end as factory fabricated, and connection and fastening accessories and devices.

1.03 QUALITY ASSURANCE

- A. Installer's Qualifications: Regularly providing installation of assemblies of the types required.
- B. Suspension systems shall be designed, fabricated, and installed to meet requirements of ASTM C635, C636, and E580, Section 5. Comply with DSA IR 25-2.13.
- C. Ceiling system components shall comply with ASTM C635 and Section 5.1 of ASTM E580.
- D. The ceiling grid system shall be rated heavy duty as defined by ASTM C635.
- E. Main runners, cross runners, splices, expansion devices, and intersection connectors shall be designed to carry a mean ultimate test load of not less than 180-lbs. in compression and tension per ASTM D580, Section 5.1.2.

1.04 EXTRA MATERIALS

- A. Furnish not less than 2-percent of each type of metal acoustical ceiling suspension assembly installed.

PART 2 - PRODUCTS

2.01 EXPOSED WIDE FACE GRID SYSTEM

09 53 23 METAL ACOUSTICAL CEILING SUSPENSION ASSEMBLIES

- A. Approved Manufacturers: Armstrong “Prelude XL HRC”, USG, Inc. “Donn DX / DXL HRC” or approved equal.
- B. Material: Hot dipped galvanized steel made from USA produced recycled steel.
- C. Main Runners: 15/16-inch flange, 1-11/16-inch high, double web construction.
(7301 HRC or approved equal)
- D. Cross Runners: 15/16-inch flange, double web construction.
(XL7341HRC or approved equal)
- E. Wall Angle, Reveals, and Miscellaneous Trim: Roll-formed from electrogalvanized steel strip to profiles indicated.
- E. Finish: Factory-applied white low gloss enamel.
- F. Structural Classification: Heavy duty meeting the requirements of ASTM C635.
- G. Provide seismic clips for grid system connections to 7/8-inch wall angle.
- H. Recycled Content:
 - 1. Total Content: 66-percent.
 - 2. Total Post-Consumer Content: 56-percent.

2.02 SUSPENSION MATERIALS AND FASTENINGS

- A. General: Comply with requirements of ASTM C635.
- B. Wire:
 - 1. General: ASTM A641, galvanized steel with class 1 coating, soft annealed; factory pre-straightened units.
 - 2. Hanger and Safety Wires: 12-gauge.
 - 3. Hanger and safety wires shall have a minimum tensile strength of 70-ksi and the maximum allowable tension load for wire shall be 350-lbs.
 - a. Four turns of the wire with 1.5-inches will develop the wire allowable load.
 - b. Three turns of the wire within 3-inches ss assumed to develop no more than 50-percent of wire allowable load.
- C. Wire Connections to Overhead Structures:
 - 1. Hanger Wires: Connection device capable of carrying not less than 100-pounds.
 - 2. Bracing Wires: Connection device capable of carrying not less than 220-pounds or the actual design load, whichever is greater, with a safety factor of 2 without yielding.
- D. Fastenings for Accessories:
 - 1. Bolts or screws of adequate size, in types appropriate for conditions and materials involved, made of corrosion-resistant materials or coated as approved.
 - 2. Concealed only, unless otherwise indicated or approved.
- E. Compression Stiffeners: Refer to sheet A5.04 for compression strut table per DSA IR 25-2.13

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

09 53 23 METAL ACOUSTICAL CEILING SUSPENSION ASSEMBLIES

- A. Installations shall be accordance with ASTM C636 and Section 5.2 of ASTM E580. Comply with the additional requirements specified in DSA IR 25-2.13.
- B. Anchor hanger and bracing wire anchors so that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire. Hanger wires shall not be more than 1 (horizontal) in 6 (vertical) out of plumb.
- C. Provide 12-gauge hanger wires at the ends of all main and cross runners within 8-inches from the support or within 1/4 of the length of the end tee, whichever is least, for the perimeter of the ceiling area. Perimeter wires are not required when the length of the end tee is 8-inches or less.
 - 1. 12-gauge hanger wires may be used for up to and including a 4-foot x 4-foot grid spacing and shall be attached to main runners. Splices in hanger wires shall develop 50-percent of the wire allowable load.
- D. Provide trapeze or other supplementary support members at obstructions to main hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits or discontinuous areas. Hanger wires more than 1 in 6 out of plumb shall have counter-sloping wires.
- E. Ceiling grid members shall be attached to not more than 2 adjacent walls in accordance with 2019 CBC Section 808.1.1 and ASTM C635 & C363 Ceiling grid members shall be at least 3/4-inch free of other walls. If walls run diagonally to ceiling grid system runners, one end of main and cross runners shall be free, and a minimum of 3/4-inch clear of wall.
- F. Ceiling grid members shall be attached to two adjacent walls per ASTM E580, Section 5.2.3. Ceiling grid members shall be at least 3/4-inch clear of other walls. If walls run diagonally to ceiling grid system runners, one end of main and cross runners shall be free, and a minimum of 3/4-inch clear of wall.
- G. The width of the perimeter supporting closure angle shall be not less than 2-inches. Use of angles with smaller widths in conjunction with proprietary perimeter clips may be acceptable if in accordance with Section 5 of IR 25-2.13.
- H. At the perimeter of the ceiling area, where main or cross runners are not connected to the adjacent wall, provide interconnection between the runners at the free end to prevent lateral spreading. A metal stabilizer or a 16-gauge wire with a positive mechanical connection to the runner may be used and placed within 8-inches of the wall. Where the perpendicular distance from the wall to the first parallel runner is 8-inches or less, the stabilizer or 16-gauge wire is not required.
- I. Expansion joints shall be provided in the ceiling at intersections of corridors and at junctions of corridors with lobbies or other areas.
- J. Lateral force bracing assemblies consisting of a compression strut and four 12-gauge splayed wires oriented 90-degrees from each other are required for all ceiling areas.
 - 1. Lateral force bracing may be omitted for suspended acoustical ceiling systems with a ceiling area not to exceed 144-sq. ft., for all values of S_{DS} when perimeter support is provided in accordance with Section 2.2 of IR 25-2.13.
 - 2. Lateral force bracing assemblies shall be spaced per Table 1 for all values of the component importance factor (I_p) of the ceiling.
 - 3. There shall be a brace assembly a distance of not more than one half of the above spacing from each surrounding wall, expansion joint and at the edges of any ceiling vertical offset.
 - 4. The slope of bracing wires shall not exceed 45-degrees from the horizontal plane and wires shall be taut. Splices in bracing wires shall develop the wire allowable load.
 - 5. Compression struts shall meet the following requirements:

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- a. The strut shall be sized to adequately resist the vertical component force induced by the ceiling bracing wires and have a maximum kl/r not to exceed 300. The struts listed in Appendix A of IR 25-2.13 meet this requirement.
- b. The strut shall not be more than one (horizontal) in six (vertical) out of plumb.

K. Attachment of Hanger and Bracing Wires:

1. Fasten hanger wires with not less than three tight turns in 3-inches. Hanger wire loops shall be tightly wrapped and sharply bent to prevent any vertical movement or rotation of the member within the loops. Refer to ASTM E580, Section 5.2.7.2.
2. Fasten bracing wires with not less than four tight turns in 1-1/2-inches.
3. Hanger and bracing wire anchorage to the structure shall be installed in such a manner that the direction of the anchorage aligns closely with the direction of the wire.
4. Separate all ceiling hanger and bracing wires at least 6-inches from all unbraced ducts, pipes, conduit, etc.
5. Hanger and bracing wires shall not attach to or bend around obstructions including but not limited to: piping, ductwork, conduit and equipment. Provide trapeze or other supplementary support members at obstructions to allow typical hanger spacing. Brace assemblies shall be configured and/or located in order to avoid obstructions in addition to maintaining the required brace assembly spacing.
6. Provide additional hangers, struts and brace assemblies as required at all ceiling breaks, soffits, or discontinuous areas.
7. Hanger wires that are more than one (horizontal) in six (vertical) out of plumb shall have counter-sloping wires.
8. Attachment of the bracing wires to the structure above and to the main runners shall be adequate for the imposed load. The weight shall be taken as not less than 4-psf for calculating seismic forces.
9. Post-installed anchors shall have a current Evaluation Report acceptable to DSA in accordance with IR A-5.
10. Powder-actuated fasteners in concrete are not permitted for bracing wires.
11. DSA approval of a construction plan is required prior to installing post-installed anchors in pre-stressed concrete. The construction plan shall demonstrate how the location of existing pre-stressing tendons and strands will be located and denoted as necessary to avoid interference.

L. Expansion Joints, Seismic Separation Joints:

1. Expansion joints shall be provided in the ceiling at intersections of corridors and at junctions of corridors and lobbies or other similar areas.
2. For ceiling areas exceeding 2,500-sq. ft., a seismic separation joint shall be provided to divide the ceiling into areas not exceeding 2,500-sq. ft. in accordance with ASTM E580, Section 5.2.9.

M. Testing of Concrete Anchors:

1. When drilled-in concrete anchors or shot-in anchors are used in reinforced concrete for hanger wires, 1 out of 10 shall be field tested for tension per requirements listed on sheet S1.00
2. When drilled-in concrete anchors are used for bracing wires, 1 out of 2 shall be field tested as noted on sheet S1.00. Shot-in anchors in concrete are not permitted for bracing wires.

N. Ceiling Fixtures, Terminals, and Devices:

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1. All fixtures, terminals, and other devices shall be mounted in a manner that will not compromise ceiling performance in accordance with 2019 CBC Section 808.1.1 ASCE 7, section 13.5. and ASTM E580 Sections 5.3 and 5.4.
2. Ceiling panels shall not support any light fixtures, air terminals or devices.
3. Penetrations through the ceiling sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a 2-inch oversized ring, sleeve or adapter through the ceiling panel to allow free movement of 1-inch in all horizontal directions. Alternatively, per ASTM E580, Section 5.2.8.5, a flexible sprinkler hose fitting that can accommodate 1-inch of ceiling movement is permitted to be used in lieu of the oversized ring, sleeve, or adapter.
4. Slack safety wires shall be considered hanger wires for installation and testing requirements.

O. Light Fixtures:

1. Light fixtures shall be positively attached to the ceiling suspension systems by mechanical means per CEC Article 410.36 to resist a horizontal force equal to the weight of the fixture. A minimum of two screws or approved fasteners are required at each light fixture, per ASTM E580, Section 5.3.1.
2. Surface-mounted light fixtures shall be attached to the main runner with a least two positive clamping devices on each fixture. The clamping device shall completely surround the supporting ceiling runner and be made of steel with a minimum thickness of 14-gauge. Rotational spring catches do not comply. A 12-gauge slack safety wire shall be connected from each clamping device to the structure above. Provide additional supports when light fixtures are 8-feet or longer or exceed 56-pounds. Maximum spacing between supports shall not exceed 8-feet.
3. Light fixtures weighing less than or equal to 10-pounds shall have a minimum of one 12-gauge slack safety wire connected from the fixture housing to the structure above.
4. Light fixtures weighting more than 10-pounds but less than or equal to 56-pounds may be supported directly on the ceiling runners but they shall have a minimum of two 12-gauge slack safety wires connected from the fixture housing at diagonal corners to the structure above.
 - a. Light fixtures greater than 2-feet x 4-feet weighing less than 56-pounds shall have a 12-gauge slack safety wire at each corner.
5. All light fixtures weighing more than 56-pounds shall be independently supported by not less than four taut 12-gauge hanger wires (one at each corner) attached from the fixture housing to the structure above or other approved hangers. The four taut 12-gauge wires or other approved hangers, including their attachment to the structure above, shall be capable of supporting four times the weight of the fixture.

P. Services within the Ceiling:

1. Flexible sprinkler hose fitting mounting brackets, ceiling-mounted air terminals or other services shall be positively attached to the ceiling suspension systems by mechanical means to resist a horizontal force equal to the weight of the component. Screws or approved fasteners are required. A minimum of two attachments are required at each component.
2. Ceiling-mounted air terminals or other services weighing less than or equal to 20—pounds shall have one 12-gauge slack safety wire attached from the terminal or service to the structure above.
3. Flexible sprinkler hose fittings, ceiling-mounted air terminals or other services weighing more than 20-pounds but less than or equal to 56-pounds shall have two 12-gauge slack safety sires (at diagonal corners) connected from the terminal or service to the structure above.

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4. Flexible sprinkler hose fittings, ceiling-mounted air terminals or other services weighing more than 56-pounds shall be supported directly from the structure above by not less than four taut 12-gauge hanger wires attached from the terminal or service to the structure above or other approved hangers. The four taut 12-gauge wires or other approved hangers, including their attachment to the structure above, shall be capable of supporting four times the weight of the unit.
- Q. Other Devices within the Ceiling: All lightweight miscellaneous devices, such as strobe lights, occupancy sensors, speakers, exit signs, etc. shall be attached to the ceiling grid as specified. In addition, devices weighing more than 10-pounds shall have a 12-gauge slack safety wire anchored to the structure above. Devices weighing more than 20-pounds shall be supported from the structure above.
- R. Pendent Mounted Light Fixtures:
1. Where pendent mounted light fixtures are to be installed in areas with a suspended ceiling, comply with IR 25-2.13 and DSA IR 16-9.
 2. Support pendant-mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting 2 times the weight of the fixture.
 3. If a pendant mounted light fixture is directly and independently braced below the ceiling, then a brack assembly is not required above the ceiling.
 4. If a pendant mounted light fixture is free to swing 45-degrees from vertical in all directions, and is not directly and independently braced below the ceiling, then a bracing assembly is only required where the pendant hanger penetrates the ceiling. Special details are required to attach the pendant hanger to the bracing assembly to transmit the horizontal and vertical forces.
 - a. Where the weight of the fixture is less than 20-pounds, the vertical component of the brace force need not be considered so no compression strut/post is required.
 5. Rigid conduit shall not be used for attachment of fixtures.
- S. Installation Tolerances:
1. Bottom surface plane of each assembly shall be within plus or minus 1/8-inch of ceiling-height level required.
 2. Bottom surface plane of each assembly shall be level and true to plane within 1/8-inch in 12-feet.

3.02 PERIMETER TRIM

- A. Provide in longest lengths available and combinations of lengths to minimize number of joints required.
- B. Do not use pieces shorter than 48-inches.
- C. Miter joints at corners.
- D. Install to neatly close with adjoining vertical surfaces.

3.03 COMPLETION

- A. Adjust hangers as required. Addition of kinks or bends in hanger are not acceptable; take up in ties only.
- B. When complete, grid members of each assembly shall be mutually parallel/square, accurately aligned, with joints neatly formed and closely fitted and aligned flush; each assembly shall be securely anchored and braced to structure to prevent movement.

- C. Exposed surfaces of grids shall be clean and free from scratches, dents, tool marks, stains, discoloration, fingerprints, and other defects and damage.

3.04 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13.
- B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

WATER VAPOR EMISSION AND HUMIDITY TESTING AND CONTROL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work of this Section includes the following:
 - 1. Retaining and paying for an independent Testing Laboratory to perform moisture vapor emission, in-concrete relative humidity and alkalinity-pH testing on new concrete slabs to receive applied floor coverings.
 - 2. Applying a vapor emission control system treatment when testing reveals vapor emission levels exceeding specified maximums at no cost to the Owner. Include mechanical preparation, control system, primers and cement topcoat products as specified.
- B. Related Sections:
 - 1. Cast-in-place concrete is specified in Section 03 30 00.
 - 2. Resilient sheet flooring is specified in Section 09 65 19
 - 3. Tile carpeting is specified in Section 09 68 13.

1.2 SUBMITTALS

- A. General: Comply with the requirements in Division 01.
- B. Product Data: Furnish product data on treatment materials proposed for use, ASTM laboratory test reports, and application instructions.
- C. Test Diagram: Prepare moisture and humidity report of each test area. Include name of company performing the test; types of testing instruments used; floor plan of building with each test location identified; starting date, time, and beginning weight; estimate of building temperature; stopping date, time, and ending weight; and computed pounds of emission, including equations.
- D. Warranty.

1.3 QUALITY ASSURANCE

- A. Installer: Manufacturer's trained personnel or factory-trained authorized installer. Installer shall have a minimum of 5-years documented experience in the installation of concrete vapor emission control systems.
- B. Manufacturer: Minimum 5-years' experience producing two-component water-based control systems.

1.4 PROJECT CONDITIONS

- A. Maintain temperature range of 55-deg. F. and 85-deg. F. for 72-hours prior to, during, and after application of vapor control sealer.

1.5 WARRANTY

- A. Warranty failure of finish flooring system due to concrete water vapor emission to the installed system for a period of 15-years from date of Substantial Completion. Include replacement of finish flooring material, and re-application of adhesive, vapor emission control system. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Vapor Emission Control Sealer: Synthetics Intl. "Synthetic 30", Ardex Engineered Cements "Ardex-MC" or approved equal.
- B. Humidity Testing Equipment: American Moisture Test "AMT Moisture / Relative Humidity Meter" or approved equal.

2.2 MATERIALS

- A. Vapor Control Sealer: Two-component waterborne polymer designed to penetrate concrete slabs and seal cracks, joints, and slab imperfections. The resins allow the polymers to saturate porous concrete and embed a dense, high compressive film strength within the concrete to restrict water vapor emission, alkalinity migration and 100-percent relative humidity transfer.
 - 1. Water Vapor Transmission Rate, ASTM E96:
 - a. Grains/sq. ft./hour: 0.6.
 - b. Pounds/1000-sq. ft./24-hrs: 2.0.
 - 2. Water Vapor Permeance, ASTM E96: 1.4-perm (inch-pound).
 - 3. Pull-off Concrete Adhesion, ASTM D4541: Minimum 225-psi.
 - 4. Alkali Resistance – 30-day Exposure, ASTM D1308: 14pH.
 - 5. In-Concrete Relative Humidity, ASTM F2170: Tolerant to 100-percent RH.
 - 6. Alkalinity pH, ASTM F710: Resistant to 14pH.
 - 7. Water Vapor Emission, ASTM F1869: Control up to 15-lbs.
 - 8. EPA Method 24 Volatile Organic Compound (VOC): 62 g/liter.
 - 9. California Department of Health Services Section 01350 Emission Testing Results: Standard Classroom & Office Space: Pass. No formaldehyde or other CREL VOCs detected.
- B. Testing Equipment: Manufacturer's standard.
- C. Humidity Testing Equipment: Manufacturer's standard sleeves, RH probes, sleeve caps and humidity meter.

PART 3 - EXECUTION

3.1 VAPOR EMISSION TESTING

- A. Perform pre-installation testing of the concrete slab by a calcium chloride test prior to the application of specified water vapor emission control system treatment. Testing shall be performed by a qualified testing personnel and Testing Laboratory.
- B. Perform three tests for the first 1,000-sq. ft. of flooring and one additional test for each additional 1,000-sq. ft. of flooring. Conduct around the perimeters of the room, center of room and where moisture may be evident.
 - 1. Moisture: Perform ASTM F1869 anhydrous calcium chloride testing on clean concrete slabs; free of curing, sealing, adhesive residue, water and surface contaminants in a area 20-inches by 20-inches 24-hours before test kits are installed.
 - 2. Alkalinity: Perform ASTM F710 alkalinity testing during retrieval of moisture tests, directly inside dome area by placing several drops of manufacture provided solution to concrete surface. Wait 60-seconds and apply digital LCD pH meter. Record results to the nearest hundredth on final test report.

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3. Temperature, Humidity and Surface Thermometer: Document temperature, humidity and surface temperature at installation and retrieval of moisture kits on final testing report. Note dew point temperature for control barrier installations.
- C. Tests shall determine the change in weight of moisture-absorbing anhydrous calcium chloride and the results shall represent the amount of moisture transmitting out of the concrete slab area. The value shall be expressed in pounds and shall be equivalent to the weight of the water that is emitted from a 1,000-sq. ft. concrete slab area in a 24-hour period of time.
- D. Unless more restrictive emission levels are required by finish flooring manufacturer, if calcium chloride testing reveals water vapor emission levels greater than 3-pounds per 1,000-sq. ft. for resilient flooring and 5-pounds per 1,000-sq. ft. for adhesively-applied carpet, apply sealer in accordance with manufacturer's instructions. Alkalinity readings shall not exceed 9.0pH for adhesive applied flooring.

3.2 HUMIDITY TESTING

- A. Where applied floor coverings have published relative humidity tolerances, perform humidity testing of concrete slabs in accordance with ASTM F2170.
- B. Test results shall be expressed in percent and whether or not the concrete is acceptable to receive floor coverings, coatings, toppings or vapor control sealers.
- C. Concrete floors to be tested shall be at service temperature and interior room space above the floor slab shall be at service temperature and service humidity for at least 48-hours.
- D. Test at a rate of three tests for areas up to 1,000-sq. ft. and one more test for each additional 1,000-sq. ft. of floor area.
- E. Select test sites away from windows, protected from direct sunlight and 4-feet from exterior walls.
- F. Drill a 2-inch deep hole using an SDS hammer drill with a 5/8-inch bit. Blow the hole free of debris using compressed air and a vacuum. Insert the pre-measured sleeve in the hole and secure. Insert the RH probe, install sleeve cap and allow to remain for 72-hours. Allow holes to reach equilibrium for 72-hours. Remove the sleeve cap and connect the meter cable to the probe. Allow the probe to re-acclimate for 30-minutes.
- G. Mark all test numbers and locations directly on the concrete surface. When readings are required at a later date, apply the sleeve cap and return to test as required.
- H. Unless more restrictive humidity levels are required by finish flooring manufacturer, do not install flooring when humidity levels are greater than 75-percent RH.

3.3 APPLICATION OF VAPOR EMISSION CONTROL SYSTEM

- A. Surface Preparation:
 1. Concrete shall cure for 48-hours and be structurally sound, clean, free of dust, grease, oil, existing coatings, paint marks, carbonated layers and other potential contaminants.
 2. Concrete shall be heavily profiled in accordance with the International Concrete Surface Repair Institute to a Concrete Surface Profile (CSP) #4.
 3. Profile edges, joints and cracks clean with a diamond crack chasing blade, removing fill.
 4. Acid etching, sanding discs or grinding surfaces are not acceptable.
 5. Vacuum entire surface with an industrial unit. Do not use clean sweep agents.
- B. Mixing: Mix in accordance with manufacturer's instructions.

- C. Application:
1. Pre-dampen concrete with clean water using an airless sprayer.
 2. Allow surface to dry for 20-minutes and broom areas that puddle.
 3. Pour product on concrete and scrub into surface with a nylon broom.
 4. While wearing spike shoes re-apply product after 40-minutes.
 5. Spread evenly over entire surface following rates recommended by manufacturer based on slab vapor emission levels. Apply multiple coats if required by slab vapor emission levels.
- D. Crack and Joint Treatment: Cracks and joints less than 1/8-inch wide may be sealed during application. Re-seal cracks that remain exposed after application with additional product for greater crack bridging in accordance with manufacturer's instructions.
- E. Cement Patching/Leveling:
1. Allow material to cure for a minimum of 12- to 24-hours before using a cement product to smooth uneven floor transitions. Cement shall be a minimum thickness of 1/8-inch to allow proper adhesive transfer.
 2. Apply a non-porous primer to secure cement products.

END OF SECTION

SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section includes the following:
 - 1. Resilient wall base.
 - 2. Resilient flooring accessories.
- B. Related Sections:
 - 1. Construction waste management is specified in Section 01 50 13.
 - 2. Resilient tile flooring is specified in Section 09 65 19.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Submit for each type of product specified.
- C. Samples: Samples for verification purposes in manufacturer's standard sizes, but not less than 12-inches long, of each different color and pattern of product specified.

1.03 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide products with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45-watts per sq. cm or more per ASTM E648.
 - 2. Smoke Density: Less than 450 per ASTM E662.
- B. All materials shall comply with the requirements of Air Quality Management District (AQMD) Rule 1168 governing the emission of Volatile Organic Compounds.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver products to Project site in original manufacturer's unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- C. Store products in dry spaces protected from the weather with ambient temperatures maintained between 50- and 90-deg. F.
- D. Move products into spaces where they will be installed at least 48-hours in advance of installation.

1.05 PROJECT CONDITIONS

- A. Maintain a minimum temperature of 70-deg. F. in spaces to receive products specified in this Section for at least 48-hours prior to installation, during installation, and for not less than 48-hours after installation. After this period, maintain a temperature of not less than 55-deg. F.
- B. Do not install products until they are at the same temperature as that of the space where they are to be installed.
- C. Close spaces to traffic during installation of products specified in this Section.

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- D. Provide for continuous ventilation during installation using as close to 100-percent outside air as possible.

1.06 SEQUENCING AND SCHEDULING

- A. Sequence installing products specified in this Section with other construction to minimize possibility of damage and soiling during remainder of construction period.

1.07 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage, and identified with labels clearly describing contents.

- 1. Furnish not less than 10-linear feet for each 500-linear feet or fraction thereof of each different type and color of resilient wall base installed.

PART 2 - PRODUCTS

2.01 RESILIENT WALL BASE

- A. Rubber Wall Base: As indicated in the Finish Legend on the Drawings.

2.02 RESILIENT ACCESSORIES

- A. Provide rubber cap for cove vinyl sheet flooring, carpet edge for glue down applications, reducer strip for resilient flooring, and tile/carpet transition strips.

- B. Profile and Dimensions: As indicated.

- C. Color: As selected by the Architect from manufacturer's standards.

2.03 INSTALLATION ACCESSORIES

- A. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

- B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

- C. Adhesives: Provide VOC-compliant type and brands of solvent free water-resistant adhesive as recommended by manufacturer of resilient wall base and accessories for conditions of installation.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Comply with manufacturer's installation specifications for preparing substrates indicated to receive products indicated.

- B. Use trowelable leveling and patching compounds per manufacturers directions to fill cracks, holes, and depressions in substrates.

- C. Broom or vacuum clean substrates to be covered immediately before installing products specified in this Section. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

3.02 INSTALLATION

- A. Install products specified in this Section using methods indicated according to manufacturer's installation directions.

- B. Apply resilient wall base to walls, columns, pilasters, casework, and other permanent fixtures in rooms and areas where base is required. Install wall base in lengths as long as practicable. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
 - 1. Install inside and exterior corners before installing straight pieces.
- C. Place resilient accessories so they are butted to adjacent materials of type indicated and bond to substrates with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.

3.03 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing installation:
 - 1. Remove visible adhesive and other surface blemishes using cleaner recommended by manufacturers of resilient product involved.
 - 2. Damp-mop resilient accessories to remove black marks and soil.
- B. Clean products specified in this Section not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products using method recommended by manufacturer.

3.04 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13
- B. Close and seal tightly all partly used adhesive containers and store protected in well ventilated fire-safe area at moderate temperatures.
- C. Place used adhesive tubes and containers in areas designated for hazardous materials.

END OF SECTION

SECTION 09 65 19

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section includes the following:
 - 1. Linoleum floor tile.
- B. Related Sections:
 - 1. Construction waste management is specified in Section 01 50 13.
 - 2. Resilient base and accessories are specified in Section 09 65 13.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Submit for each type of product specified. Include certification by tile manufacturer that products supplied for tile installation comply with local regulations controlling use of volatile organic compounds (VOC's).
- C. Samples: For verification purposes in full-size tiles of each different color and pattern of resilient floor tile specified, showing full range of variations expected in these characteristics.
- D. Maintenance data for resilient floor tile, to include in Operating and Maintenance Manual.
- E. MSDS data sheets for adhesive.

1.03 QUALITY ASSURANCE

- A. Single-Source Responsibility for Floor Tile: Obtain each type, color, and pattern of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the work.
- B. Fire Performance Characteristics: Provide resilient floor tile with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45-watts per sq. cm or more per ASTM E648.
 - 2. Smoke Density: Less than 450 per ASTM E662.
- C. All materials shall comply with the requirements of Air Quality Management District (AQMD) Rule 1168 governing the emission of Volatile Organic Compounds.

1.04 REGULATORY REQUIREMENTS

- A. Slip Resistant Surfaces: Conform to the more restrictive provisions of Title III of the Americans with Disabilities Act or with California Building Code (CBC).
 - 1. Resilient flooring shall have a coefficient of friction of at least 0.6 per ASTM D2047.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver tiles and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

- C. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50-deg. F. and 90-deg. F.
- D. Store tiles on flat surfaces. Move tiles and installation accessories into spaces where they will be installed at least 48-hours in advance of installation.

1.06 PROJECT CONDITIONS

- A. Maintain a minimum temperature of 70-deg. F. in spaces to receive tiles for at least 48-hours prior to installation, during installation, and for not less than 48-hours after installation. After this period, maintain a temperature of not less than 55-deg. F.
- B. Do not install tiles until they are at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during tile installation.
- D. Provide for continuous ventilation during installation using as close to 100-percent outside air as possible.

1.07 SEQUENCING AND SCHEDULING

- A. Install tiles and accessories after other finishing operations, including painting, have been completed.
- B. Do not install tiles over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as determined by tile manufacturer's recommended bond and moisture test.

1.08 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
 - 1. Furnish not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern and size of resilient floor tile installed.

PART 2 - PRODUCTS

2.01 RESILIENT TILE FLOORING

- A. Linoleum Floor Tile: Forbo Marmoleum, Fresco 3871 "Silver Birch"

2.02 INSTALLATION ACCESSORIES

- A. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.
- B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.
- C. Adhesives: Provide VOC-compliant type and brands of solvent free water-resistant adhesive as recommended by manufacturer of resilient wall base and accessories for conditions of installation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas where installation of tiles will occur, with Installer present, to verify that substrates and conditions are satisfactory for tile installation and comply with tile manufacturer's requirements and those specified in this Section.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.
 2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive tile.
- B. Use trowelable leveling and patching compounds per tile manufacturer's directions to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.
- D. Broom or vacuum clean substrates to be covered by tiles immediately before tile installation. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
- E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.

3.03 INSTALLATION

- A. General: Comply with tile manufacturer's installation directions and other requirements indicated that are applicable to each type of tile installation included in Project.
- B. Lay out 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 at perimeter that equal less than one-half of a tile. Install tiles square with room axis, unless otherwise indicated.
- C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles with grain running in one direction unless otherwise indicated or directed by the Architect.
- D. Scribe, cut, and fit tiles to butt tightly to vertical surfaces, permanent fixtures, built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.
- E. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.
- G. Adhere tiles to flooring substrates without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.

- H. Use full spread of adhesive applied to substrate in compliance with tile manufacturer's directions including those for trowel notching, adhesive mixing, and adhesive open and working times.
- I. Hand roll tiles where required by tile manufacturer.

3.04 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing tile installation:
 - 1. Remove visible adhesive and other surface blemishes using cleaner recommended by tile manufacturers.
 - 2. Sweep or vacuum floor thoroughly.
 - 3. Do not wash floor until after time period recommended by resilient floor tile manufacturer.
 - 4. Damp-mop tile to remove black marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended by tile manufacturer.
 - 1. Cover tiles with undyed, untreated building paper until inspection for Acceptance of Work.
 - 2. Do not move heavy and sharp objects directly over tiles. Place plywood or hardboard panels over tiles and under objects while they are being moved. Slide or roll objects over panels without moving panels.
- C. Clean tiles not more than 4-days prior to dates scheduled for final acceptance. Clean tiles using method recommended by manufacturer.

3.05 CONSTRUCTION WASTE MANAGEMENT

- A. General: As specified in Section 01 50 13
- B. Separate waste and place in the following categories for re-use:
 - 1. Full size tiles.
- C. Linoleum and cork, if used, are biodegradable and may be shredded and composted.
- D. Close and seal tightly all partly used adhesive containers and store protected in well-ventilated fire-safe area at moderate temperatures.
- E. Place used adhesive tubes and containers in areas designated for hazardous materials.

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing tile carpeting.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Resilient base and accessories are specified in Section 09 65 13.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Include the following:
 - 1. Reports documenting the results of tests by a NVLAP approved laboratory for electrostatic propensity and flooring radiant panel test.
 - 2. Catalog data and product physical characteristics.
 - 3. Manufacturer's printed installation instructions, surface preparation, seaming techniques, recommended adhesives and other installation accessories.
 - 4. Statement verifying environmental requirements.
 - 5. Maintenance instructions including recommended cleaning equipment and materials, spot removal information, and cleaning methods.
- C. Samples:
 - 1. For verification purposes, two full size tiles of each color and pattern selected.
 - 2. 12-inch long sample of carpet accessories.
- D. Layout Drawings: Show layout of each area to be covered for approval of pattern, and any pertinent installation details.
- E. Maintenance Materials:
 - 1. Furnish the Owner with a minimum of 5-percent of each different material and color used in this Project from same dye lot or production run for compatibility with the installed materials.
 - 2. Furnish materials in securely wrapped packages or factory sealed packing with the manufacturer's standard labels and the material and color designation used in these specifications.
 - 3. Deliver material to the Owner's on site designated storage place, unloaded and positioned in place per Owner's instructions.

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4. Furnish a signed receipt indicating materials and quantities upon delivery.

F. Warranty.

1.03 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Carpet tiles shall be approved by applicable jurisdictions.
- B. Fire Hazard Classification: Class I floor finish. Minimum critical flux limit of 0.45-watts/square centimeter when tested in accordance with NFPA 253.
- C. Static electricity generation of installed carpet shall not exceed 3.5 KV at 70-deg. F and 20-percent R.H. for life of carpet tile.
- D. Installer's Qualifications: Installer shall be approved by carpet tile manufacturer, and shall have regularly been providing installations of the types required for no less than five years..
- E. Visually perceptible deviations in color at sides and end seams shall not be acceptable.
- F. Indoor Air Quality: Carpet tile shall meet or exceed the minimum standards contained in the Carpet and Rug Industry (CRI) Institute consumer information label.
- G. Comply with CRI – Carpet and Rug Institute Indoor Air Quality Green Label Testing Program.
 - 1. All carpet tile products shall comply with the VOC limit established by the Carpet and Rug Institute (CRI) Green Label Indoor Air Quality Test Program.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver and store packaged materials in original containers labels intact until time for use, with seals unbroken and store rolls in a flat position. Protect from damage, dirt, stains and moisture.
- C. Do not store carpet tile near products that can off gas harmful substances.

1.05 PROJECT CONDITIONS

- A. Sequencing Schedule: Do not install carpet tiles until building is entirely closed in, wet work and painting is completed, and heating system is in operation.
- B. Use adhesives in strict compliance with manufacturer's recommendations, and ventilate area with maximum outside air for a minimum of 48-hours after installation.
- C. Test substrates to ensure that no dusting will occur through installed carpet tile. Apply sealer on porous concrete surfaces where required to prevent dusting.

1.06 INDOOR AIR QUALITY

- A. Pre-ventilate carpet tile in well ventilated, uninhabited space for a few days prior to installation.
- B. Provide maximum ventilation during installation.

- C. Isolate area of installation from remainder of building.
- D. Clean new carpet tile thoroughly with a high-efficiency particulate air (HEPA) filtration vacuum.

1.07 WARRANTY

- A. Warrant the carpet tile to be free of defects for a period of 5-years from date of Substantial Completion. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.01 CARPET TILE

- A. General: Carpet substitutions shall match all characteristics of the specified carpet.
- B. Carpet Tile: Tandus Centiva, Powerbond Assertive Stria 04839, "Steelwork 26202"

2.02 ACCESSORIES

- A. Carpet Adhesive: VOC-compliant acrylic emulsion, solvent-free, meeting or exceeding CRI "Green Label" requirements, as recommended by carpet tile manufacturer.
- B. Crack Filler: Latex base type.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive carpet tiles and verify that surfaces are suitable for installation.
- B. Test concrete floors for moisture with suitable moisture meter. Moisture shall not exceed adhesive manufacturer's recommendations, as specified in Section 09 61 43.
- C. Do not begin installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Subfloor:
 - 1. Prior to installation, repair minor floor irregularities and thoroughly clean floor, leaving no dirt or grit.
 - 2. Fill cracks exceeding 1/16-inch in width with crack filler and sand smooth.
 - 3. Confirm compatibility of adhesive with sealers or curing agents on concrete floors.

3.03 INSTALLATION

- A. Apply carpet tiles in strict accordance with manufacturer's instructions.
- B. Install carpet tiles in accordance with the recommendations contained in the Carpet and Rug Institute (CRI) "CRI Carpet Installation Standard 2011"
http://www.carpet-rug.org/pdf_word_docs/CRI_Carpet_Installation_Standard_2011.pdf.
- C. Cement carpet tiles directly to floor. Remove excess cement with approved solvent.

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- D. Cut evenly along walls, cut and fit evenly around projections, corners, pipes, electrical outlets, floor air or heating elements, and trim strips.
- E. Securely fasten carpet edging strips to floor wherever carpet tiles meet different floor material and no threshold or other divider is noted.
- F. Extend carpet tile materials under all open-bottomed and raised-bottom obstructions, and under removable flanges of obstructions. Extend carpet tiles into closets and alcoves of rooms indicated to receive carpeting, unless another material is specifically identified to be used in that space. Carpet tile shall be installed under all movable furniture and equipment.
- G. Finish installation shall be free from visual defects.
- H. The Owner may review carpet tile scraps and retain any he chooses. Remove remainder of scraps from site.
- I. Leave carpet base and walls clean and free from stains, blemishes and other foreign material. Remove loose threads and vacuum clean.
- J. Installation shall not receive furniture or heavy traffic for 48-hours after installation.

3.04 CLEAN UP

- A. After completion of the carpet tile installation, remove all waste and excess materials, tools and equipment. The complete installation shall be thoroughly vacuumed, using an upright, commercial grade, beater type cleaner, and left in a clean condition. Provide all necessary temporary protection required.

3.05 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13.
- B. All scraps of unused material shall be reclaimed and recycled by the carpet tile manufacturer. Include a detailed confirmation of the material received by the manufacturer and documentation that these materials haven recycled into new flooring materials. No incineration of reclaimed materials is acceptable.

END OF SECTION

SECTION 09 81 00

ACOUSTIC INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for furnishing and installing acoustic insulation.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Thermal insulation is specified in Section 07 21 00.
 - 3. Roof board insulation is specified in Section 07 22 16.
 - 4. Firestopping insulation is specified in Section 07 84 00.
 - 5. Acoustical joint sealants are specified in Section 07 92 19.

1.02 SUBMITTALS

- A. General: As specified in Section 01 33 00.
- B. Product Data: Manufacturer's specifications for each type of insulation required.

1.03 QUALITY ASSURANCE

- A. Fire Ratings: Comply with fire-resistance and flammability ratings specified.
- B. Acoustic insulation shall be Green Guard Children & Schools Certified.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Protect insulation from physical damage and from becoming wet or soiled. Comply with manufacturer's recommendations for handling, storage and protection during installation.

1.05 INDOOR AIR QUALITY

- A. Protect ducts and HVAC system from loose insulation particulates.
- B. Provide temporary ventilation of building areas where building insulation is being installed.

PART 2 - PRODUCTS

2.01 ACOUSTIC INSULATION

- A. Formaldehyde-Free Unfaced Mineral/Glass Fiber Blanket/Batt Acoustical Insulation: Acoustical insulation produced by combining glass fibers with formaldehyde-free thermosetting resins to comply with ASTM C665, Type I.
 - 1. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50 when tested in accordance with ASTM E84.
 - 2. Approved Manufacturers: Johns Manville "Formaldehyde-Free Sound Control Fiber Glass Batts", Owens Corning "QuietZone Acoustic Batts" or approved equal.
 - 3. Thickness: 3-inches unless otherwise indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's instructions for installation conditions.
- B. Do not install insulation until building is sufficiently enclosed or protected against absorption of moisture by the insulation, and do not install insulation unless supporting framing and construction is in a thoroughly dry condition.
- C. Install snugly between framing members with ends snugly fitted between units and against adjacent construction.
- D. Carefully cut and fit insulation around pipes, conduit, and other obstructions and penetrations.
- E. Where door and window frames occur in framing, cut additional strips of insulation and hand-pack as required to fill voids in and around such frames.

3.02 PROTECTION

- A. Protect installed insulation from harmful exposures and from physical damage.

3.03 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13.
- B. Plan and coordinate the insulation work to minimize the generation of offcuts and waste. Remove insulation scraps to the maximum extent feasible.
- C. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes the requirements for painting and finishing of interior and exterior exposed items and surfaces.
1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatments specified in other Sections.
 2. Work includes painting exposed pipes and ducts, hangers, exposed steel and iron, and primed metal surfaces of Mechanical and Electrical equipment, and general sheet metal work, except as otherwise indicated or specified.
 3. Work includes painting hardware specified as primed (USP or 600).
 4. Work includes sanding shop-primed surfaces and applying specified primer and finish coats.
 5. "Paint" means coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
- B. Surfaces Not to Be Painted:
1. Pre-finished items, including but not limited to acoustic materials, casework, and finished mechanical and electrical equipment, including light fixtures, switchgear and distribution cabinets.
 2. Concealed surfaces such as walls or ceilings in concealed areas and inaccessible areas, furred areas, pipe spaces, and duct shafts.
 3. Finished metal surfaces such as anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials, exterior aluminum entrances, storefronts, and windows.
 4. Prefinished metal roofing.
 5. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts.
- C. Following categories of work are included under other Sections:
1. Shop priming ferrous metal items including structural steel, metal fabrications, hollow metal work and similar items. The work of this Section includes sanding and applying specified primer on all shop-primed surfaces exposed to view in the completed work.
 2. Shop priming of fabricated components such as architectural woodwork, wood casework and shop-fabricated or factory-built mechanical and electrical equipment or accessories.
- D. Do not paint over code-required labels, equipment identification, performance rating, name, or nomenclature plates.
- E. Related Sections:
1. Construction waste management is specified in Section 01 50 13.

1.02 SUBMITTALS

09 91 00 PAINTING

- A. General: Comply with Section 01 33 00.
- B. Certification: Furnish certification by the paint manufacturer that products supplied comply with local regulations controlling the use of volatile organic compounds (VOCs).
- C. Samples: Furnish samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.
 - 1. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture is achieved.
 - 2. Furnish samples on the following substrates for review of color and texture only:
 - a. Painted Wood: Two 12-inch square samples of each color and material on hardboard.
 - b. Stained or Natural Wood: Two 4-inch x 8-inch samples of natural and stained wood finish on actual wood samples.
- D. Product Data: Specified paint systems are those of Benjamin Moore, Dunn Edwards, Kelly Moore, Sherwin Williams and Vista. If other paint manufacturers are proposed and accepted by the Architect, furnish product comparison charts showing that proposed paint systems are equal to the specified materials in number of coats, type of paint, and sheen.

1.03 QUALITY ASSURANCE

- A. Applicators Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent.
- B. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use thinners approved by paint manufacturer, and use within recommended limits.
- C. Coordination of Work: Review other Sections in which prime paints are to be provided to ensure compatibility of coatings system for various substrates. Upon request, furnish information or characteristics of finish materials to be used.
- D. Requirements of Regulatory Agencies: Comply with applicable rules and regulations of governing agencies for air quality control.
 - 1. Comply with current applicable regulations of the local air quality district, California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).
 - 2. Regulatory changes may affect the formulation, availability, or use of specified coatings. Confirm availability of coatings to be used prior to start of painting.
- E. Field Samples: On interior and exterior wall surfaces provide full-coat finish samples on at least 100-sq. ft. of surface, as directed, until required sheen, color and texture is obtained; simulate finished lighting conditions for review of in-place work. Approved samples will be used as a standard for the Project.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name, batch number, color, and directions.
- C. Store materials in tightly covered containers. Maintain containers in a clean condition, free of foreign materials and residue.
- D. Keep storage area neat and orderly. Remove oily rags and waste daily. Ensure that workers and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.05 JOB CONDITIONS

- A. Apply water-base paints when temperature of surfaces to be painted and surrounding air temperatures are between 50-deg. F. and 90-deg. F., unless otherwise permitted by paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45-deg. F. and 90-deg. F., unless otherwise permitted by paint manufacturer's printed instructions.
- C. Do not apply paint in rain, fog or mist, when relative humidity exceeds 85-percent, or when temperature is less than 5-deg. F. above dew point, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.
- D. Provide adequate ventilation during interior painting using as close to 100-percent outside air as possible.

1.06 EXTRA MATERIALS

- A. In addition to materials for completion of the work, furnish 5-gallons of additional materials for each type and color of opaque paint used.
- B. Furnish extra materials from same production lots or color runs used in the work. Furnish in containers factory sealed and labeled. Identify each container with Project name and type of material.
- C. Deliver materials and an inventory list just prior to Substantial Completion and store where directed by Owner.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Benjamin Moore, Dunn Edwards, Kelly Moore, Sherwin Williams, Vista or approved equal.

2.02 MATERIALS

- A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application.
- B. Material Quality: Provide best quality grade of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable. Each product within any one paint system shall be from the same manufacturer.

2.03 COLORS

- A. Interior Paint Colors: As indicated in the Finish Legend on the Drawings.
- B. Exterior Colors: Match color chips furnished by the Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which painting is to be applied. Surfaces receiving paint shall be thoroughly dry before paint is applied.
 - 1. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect prior to applying barrier coats.
 - 2. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning.

3. Start of painting will be construed as the applicator's acceptance of surfaces and conditions within a particular area.

3.02 PROTECTION

- A. Protection: Protect work of other Sections against damage by painting and finishing work. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
 1. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
 2. Remove or protect hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting. Following completion of painting, reinstall removed items.
 3. At completion of work of other Sections, touch-up and restore damaged or defaced painted surfaces.

3.03 SURFACE PREPARATION

- A. Concrete and Masonry:
 1. Prepare surfaces to be painted by removing surface contaminants.
 - a. Remove efflorescence with stiff bristle brush, wire brushing, wiping, sandblasting or acid washing and rinsing. Allow to dry.
 - b. Remove chalk, dust, dirt, asphalt, tar or excessive mortar by scraping or wire brushing.
 - c. Remove rust, grease or oil by solvent cleaning or sandblasting.
 - d. Treat concrete surfaces which are highly glazed or where traces of form release agents are present with a preparation of one-part concentrated muriatic acid, 4-parts water and one-part detergent or as recommended by parting compound manufacturer. Remove acid with water. Allow to dry.
 - e. Remove stains on concrete resulting from weathering or corroded metals, with a solution of 2-oz. sodium methasilicate in one-gallon water. Wet stained areas with water before application of solution. Allow to dry.
 - f. Chemical Surface Preparation of Concrete Floors:
 1. Acid etching, as specified in ASTM D4260 and NACE Standard RP0892.15 may be used to remove laitance and weak concrete and to provide a surface profile on horizontal concrete surfaces.
 2. The method requires complete removal of all reaction products and pH testing to ensure neutralization of the acid. Acid etching is not recommended for vertical surfaces and areas where curing compounds or sealers have been used.
 3. Acid etching shall only be used where procedures for handling, containment, and disposal of the hazardous materials are in place.
 4. Acid etching with hydrochloric acid shall not be used where corrosion of metal in the concrete is likely to occur.
 5. Blast tracking may be used at Contractor's option.
- B. Plaster:
 1. Clean surfaces free from grit, loose plaster and surface irregularities.

2. Determine alkalinity and moisture content by performing appropriate tests. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's literature or where pH exceeds 10.
- C. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
1. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dry.
 2. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
 3. When transparent finish is required, back-prime with spar varnish.
 4. Back-prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
 5. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.
- D. Ferrous Metal: Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of The Society for Protective Coatings (SSPC).
1. Blast surfaces clean as recommended by the paint system manufacturer and according to requirements of SSPC specification SSPC-SP 10.
 2. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 3. Sand shop-applied prime coats to a smooth surface, ready to receive specified primer and finish coats.
- E. Galvanized Metals:
1. Clean galvanized metal with an appropriate metal prep and passivator remover.
 2. Perform the following test to ensure passivator removal:
 - a. With a 5-percent copper sulfate solution, place a swab or droplets on the prepared area. If the copper sulfate causes the galvanized coating to blacken, passivator has been removed and the surface is ready for paint application.
 - b. If the copper sulfate has no effect on the galvanized coating, continue with metal prep solution, prepared in accordance with SSPC-SP 16 "Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals" or use a scotch pad to abrade it, being careful not to remove the galvanizing.
 3. Document the process and successful passivator removal with photographs.
 4. Prepare weathered galvanized metals that have developed a layer of white rust by wire brushing or scrubbing with a stiff brush or abrasive pad to remove the white rust.
- F. Gypsum Board: Clean surfaces of dust, dirt, grease, oil and other foreign matter and dust clean.

- G. Existing Surfaces to be Repainted: Thoroughly clean and de-gloss surfaces to be repainted by sanding or other means prior to painting. Patched and bare areas shall be shop-primed with same alkyd primer as specified for new work.

3.04 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and strain material before using.
- D. Use thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.05 APPLICATION

- A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Provide finish coats compatible with prime coats.
 - 2. The number of coats required is the same regardless of the application method. Do not apply following coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where required to produce a smooth even surface.
 - 3. Apply additional coats when undercoats, stains or other conditions show through final coat, until paint film is of uniform finish, color and appearance. Edges, corners, crevices, welds, and exposed fasteners shall receive a dry film thickness equivalent to that of flat surfaces.
 - 4. Paint surfaces behind movable equipment and furniture.
 - 5. Paint surfaces behind permanently-fixed equipment or furniture with prime coat before final installation of equipment.
 - 6. Paint visible surfaces of ducts where visible through registers or grilles with a flat, non-specular black paint.
 - 7. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
 - 8. Finish doors on top, bottom and side edges same as faces. Where openings into rooms have different finishes, finish door edges as directed by the Architect.
 - 9. Omit primer on metal surfaces that have been shop-primed and touch-up painted, unless otherwise indicated.
- B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation.
 - 1. Allow sufficient time between successive coatings to permit proper drying.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's instructions.
 - 1. Brushes: Use brushes best suited for the material applied.

2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate.
- E. Mechanical and Electrical Work: Painting mechanical and electrical work is limited to items exposed in mechanical equipment rooms and in occupied spaces. Finish to match adjoining wall or ceiling surfaces.
1. Mechanical items to be painted include, but are not limited to, piping, hangers, and supports; heat exchangers; tanks; ductwork; insulation; supports; motors and mechanical equipment; air grilles and diffusers; and accessory items.
 2. Electrical items to be painted include, but are not limited to conduit and fittings, panels, and switchgear.
- F. Block Filler: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores completely filled flush, free of pinholes. Provide multiple coats if required.
- G. Prime Coats: Before applying finish coats, apply a prime coat. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas to assure a finish coat with no burn-through or other defects.
- H. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness and other surface imperfections will not be acceptable.
- I. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
- J. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.06 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during painting.
1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
 2. The testing laboratory will perform appropriate tests for material analysis, abrasion resistance, reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, re-coating, skinning, color retention, alkali and mildew resistance, and application to specified mil thickness.
 3. If test results show material being used does not comply with specified requirements, the Contractor may be directed to stop painting, remove non-complying paint, pay for testing, repaint surfaces coated with rejected material, and remove rejected material from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible.

3.07 CLEANING

- A. Clean-Up: During progress of work, remove discarded paint materials, rubbish, cans and rags at end of each work day.

- B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by washing and scraping; do not scratch or damage finished surfaces.

3.08 EXTERIOR PAINT SCHEDULE

	BENJAMIN MOORE	DUNN-EDWARDS	KELLY-MOORE	SHERWIN WILLIAMS	VISTA	MPI CATEGORY
A. Ferrous Metal, 100% Acrylic Semigloss						
First Coat	Acrylic Metal Primer M04	BRPR00 Series Bloc-Rust	5725 DTM Acrylic Primer/Finish	ProCryl B66-310 Acrylic Primer	9600 Protec Metal Primer	107
Second Coat	Aura Exterior Semi-Gloss #632	SSHL50 Spartashield SG	1215 Premium Professional SG	A-100 A8 Selmigloss	7000 Acriglo Semi Gloss	11
Third Coat	Aura Exterior Semi-Gloss #632	SSHL50 Spartashield SG	1215 Premium Professional SG	A-100 A8 Semigloss	7000 Acriglo Semi Gloss	11
B. Galvanized and Zinc Alloy Metal, 100% Acrylic Semigloss						
Pretreatment	Etch	ME-01 Krud Kutter Metal Clean & Etch	Krud Kutter Metal Clean & Etch	B71Y1 DTM Wash Primer	Krud Kutter Metal Etch	
First Coat	Fresh Start Acrylic Primer #023	ULGM00 Ultrashield Galvanized Metal Primer	5725 DTM Acrylic Primer/Finish	ProCryl B66-310Primer	4800 Metal Pro Primer	134
Second Coat	Aura Exterior Semi-Gloss #632	SSHL50 Spartashield SG	1215 Premium Professional SG	A-100 A8 Semigloss	7000 Acriglo Semi Gloss	11
Third Coat	Aura Exterior Semi-Gloss #632	SSHL50 Spartashield SG	1215 Premium Professional SG	A-100 A8 Semigloss	7000 Acriglo Semi Gloss	11
C. Concrete, Plaster, 100% Acrylic Flat						
First Coat	Fresh Start Acrylic Primer N023	ESPR00 Eff-Stop Premium Primer	247 Acry-Shield	A24W300 Loxon Primer	2800 Acriglo	3
Second and Third Coats	Aura Exterior Flat 629	SSHL10 Spartashield Flat	1200 Premium Professional Flat	A-100 A6 Flat	2800 Acriglo	10
D. Concrete Block, 100% Acrylic Flat						
First Coat	Latex Block Filler 244	SBSL00 Smooth Blocfil Select	521 Premium Professional Filler	B25W25 Prep Rite Block Filler	040 Acrylic Block Filler	4
Second and Third Coats	Aura Exterior Flat 629	SSHL10 Spartashield Flat	1200 Premium Professional Flat	A-100 A6 Flat	2800 Acriglo	10
E. Wood, 100% Acrylic Semigloss						
First Coat	Fresh Start Acrylic Primer N023	EZPR00 EZ-Prime Premium	255 Acry-Shield	B42W81 Exterior Latex Primer	4200 Terminator II	6
Second and Third Coats	Aura Exterior Semi-Gloss 632	SSHL50 Spartashield SG	1215 Premium Professional SG	A-100 A8 Semigloss	7000 Acriglo Semi Gloss	11
F. Wood, Acrylic Semi-Transparent Stain						
First and Second Coats	Moorewood Acrylic ST Stain 98	ZIN-OK 700 Series Okon Weather Pro	1288 Acry-Shield	A15T5 WoodScapes	Monopole Aquaseal Stain	156

3.09 INTERIOR PAINT SCHEDULE

	BENJAMIN	DUNN-	KELLY-	SHERWIN	VISTA	MPI
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09 91 00 PAINTING

	MOORE	EDWARDS	MOORE	WILLIAMS		CATEGORY
A. Wood, 100% Acrylic Low Odor/Zero VOC Semigloss						
First Coat	Eco Spec WB Primer N372	UGSL00 Ultra-Grip Select	973 Acry-Plex	ProMar 200 Zero B28-200 Primer	5001 V-Pro Primer	46
Second and Third Coats	Eco Spec Latex Semi-Gloss N376	SZRO50 Spartazero Semi-Gloss	1050 Premium Professional SG	ProMar 200 Zero B31-2600 Semi-Gloss	5400 V-Pro Semi Gloss	---
B. Wood, Clear Satin Urethane Finish						
First Coat	Benwood Quick Dry Sanding Sealer 413	Defthane Polyurethane Gloss	Old Masters Masters Armor Satin	A68V91 Wood Classics WB Polyurethane Varnish GL	Defthane Polyurethane Gloss	---
Second and Third Coats	Benwood Acrylic Polyurethane Low Lustre 423	Defthane Polyurethane Satin	Old Masters Masters Armor Satin	A68 Wood Classics WB Polyurethane Varnish SG	Defthane Polyurethane Satin	128
C. Wood, Stain and Satin Urethane Finish						
First Coat	Lenmar 1 WB Wiping Stain	Old Masters Wiping Stain	Old Masters Wiping Stain	Minwax 250 Oil Stain	Old Masters Wiping Stain	90
Second Coat	Benwood Quick Dry Sanding Sealer #413	Old Masters Water-Based Sanding Sealer	2783 Woodcraft Clear Vinyl Sealer	A68V91 Wood Classics WB Polyurethane Varnish GL	Old Masters Water-Based Sanding Sealer	---
Third and Fourth Coats	Benwood Polyurethane Low Lustre 423	Old Masters Water-Based Polyurethane Satin	Old Masters Masters Armor Satin	A68 Wood Classics WB Polyurethane Varnish SG	Old Masters Water-Based Polyurethane Satin	128
D. Concrete and Plaster, Acrylic Low Odor/Zero VOC Flat						
First Coat	Eco Spec Latex Primer Sealer N372	Ultra-Grip Select UGSL00	971 Acry-Plex	ProMar 200 Zero B28-2600 Primer	5001 V-Pro Primer	50
Second and Third Coats	Eco Spec Latex Flat 373	SZRO10 Spartazero Flat	1005 Premium Professional Flat	ProMar 200 Zero B30w2600 Flat	5100 V-Pro Flat	143
E. Concrete and Plaster, 100% Acrylic Low Odor/Zero VOC Low Sheen/Eggshell						
First Coat	Eco Spec Latex Primer Sealer N372	UGSL00 Ultra-Grip Select	971 Acry-Plex	ProMar 200 Zero B28w2600 Primer	5001 V-Pro Primer	50
Second and Third Coats	Eco Spec Latex Eggshell Finish N374	SZRO30 Spartazero Eggshell	1010 Premium Professional Eggshell	ProMar 200 Zero B20w2651 Eggshell	5300 V-Pro Eggshell	145
F. Concrete and Plaster, 100% Acrylic Low Odor/Zero VOC Semigloss						
First Coat	Eco Spec Latex Primer Sealer N372	SBSL00 Smooth Blocfil Select	971 Acry-Plex	ProMar 200 Zero B28-2600 Primer	5001 V-Pro Primer	50
Second and Third Coats	Eco Spec Latex Semi-Gloss N376	SZRO50 Spartazero Semi-Gloss	1050 Premium Professional Semi-Gloss	HP Acrylic B66w651 Semi-Gloss	5400 V-Pro Semi Gloss	147
G. Concrete Block, Acrylic Low Odor/Zero VOC Flat						
First Coat	PPG 6-15 Masonry Block Filler	SBSL00 Smooth Blocfil Select	521 Premium Professional Filler	B25W25 PrepRite Block Filler	040 Acrylic Block Filler	4
Second and Third Coats	Eco Spec Latex Flat 373	SZRO10 Spartazero Flat	1005 Premium Professional Flat	ProMar 200 Zero B30w2600 Flat	5100 V-Pro Flat	143
H. Concrete Block, 100% Acrylic Low Odor/Zero VOC Semigloss						
First Coat	PPG 6-15 Masonry	SBSL00 Smooth	521 Premium	B25W25 PrepRite	040 Acrylic Block Filler	4

		Block Filler	Blocfil Select	Professional Filler	Block Filler		
	Second and Third Coats	Eco Spec Latex Semi-Gloss N376	SZRO50 Spartazero Semi-Gloss	1050 Premium Professional Semi-Gloss	HP Acrylic B66w651 Semi-Gloss	5400 V-Pro Semi Gloss	147
I. Concrete Block, Epoxy Semigloss							
	First Coat	PPG 6-15 Masonry Block Filler	Carboline Sanitile 100	521 Premium Professional Filler	B25W25 PrepRite Block Filler	040 Acrylic Block Filler	4
	Second and Third Coats	PPG 16-510 WB1 Pitt Glaze Acrylic Epoxy	Carboline Sanitile 255 Semi-Gloss	Tru-Glaze – WB 4428	K46 Pro Industrial WB Epoxy	Carboline Sanitile 255 Semi-Gloss	115
J. Gypsum Board, Acrylic Low Odor/Zero VOC Flat							
	First Coat	Eco Spec Latex Primer Sealer 372	VNSL00 Vinylastic Select	971 Acry-Plex	ProMar 200 Zero B28w2600 Primer	5100 V-Pro Flat	149
	Second and Third Coats	Eco Spec Latex Flat 373	SZRO10 Spartazero Flat	1005 Premium Professional Flat	ProMar 200 Zero B30w2600 Flat	5100 V-Pro Flat	143
K. Gypsum Board, 100% Acrylic Low Odor/Zero VOC Low Sheen/Eggshell							
	First Coat	Eco Spec Latex Primer Sealer 372	VNSL00 Vinylastic Select	971 Acry-Plex	ProMar 200 Zero B28w2600 Primer	5001 V-Pro Primer	149
	Second and Third Coats	Eco Spec Latex Eggshell Finish 374	SZRO30 Spartazero Eggshell	1010 Premium Professional Eggshell	ProMar 200 Zero B28-2651 Eggshell	5300 V-Pro Eggshell	145
L. Gypsum Board, 100% Acrylic Low Odor/Zero VOC Semigloss							
	First Coat	Eco Spec Latex Primer Sealer 372	VNSL00 Vinylastic Select	971 Acry-Plex	ProMar 200 Zero B28w2600 Primer	5001 V-Pro Primer	149
	Second and Third Coats	Eco Spec Latex Semi-Gloss N376	SZRO50 Spartazero Semi-Gloss	1050 Premium Professional SG	HP Acrylic B66w651 Semi-Gloss	5400 V-Pro Semi Gloss	147
M. Gypsum Board, Epoxy Semigloss							
	Barrier Coat	Zinsser Gardz	Zinsser Gardz	Zinsser Gardz	Zinsser Gardz	Zinsser Gardz	
	First Coat	Eco Spec Latex Primer Sealer 372	Carboline Sanitile 120	971 Acry-Plex	PrepRite 200 Latex Primer	Carboline Sanitile 120	149
	Second and Third Coats	PPG 16-510 WB1 Pitt Glaze Acrylic Epoxy	Carboline Sanitile 255 Semi-Gloss	Tru-Glaze – WB - 4428	K46 Pro Industrial WB Epoxy	Carboline Sanitile 255 Semi-Gloss	115
N. Ferrous Metal, 100% Acrylic Low Odor/Zero VOC Semigloss							
	First Coat	Super Spec Metal Primer P04	BRPR00 Series Bloc-Rust	5725 DTM Acrylic Primer/Finish	ProCryl B66-310 Acrylic Primer	9600 Protec Metal Primer	107
	Second and Third Coats	Eco Spec Latex Semi-Gloss N376	SZRO50 Spartazero Semi-Gloss	1050 Premium Professional SG	HP Acrylic B66w651 Semi-Gloss	7000 Acriglo Semi Gloss	147
O. Non-Ferrous Metal, 100% Acrylic Low Odor/Zero VOC Semigloss							
	Pretreatment	Etch	ME-01 Krud Kutter Metal Clean & Etch	Krud Kutter Metal Etch	B71Y1 Wash Primer	Krud Kutter Metal Etch	
	First Coat	Super Spec Metal Primer P04	ULGM00 Ultrashield Galvanized Metal Primer	5725 DTM Acrylic Primer/Finish	ProCryl B66-310 Acrylic Primer	4800 Metal Pro Primer	107
	Second and Third Coats	Eco Spec Latex Semi-Gloss N376	SZRO50 Spartazero Semi-Gloss	1050 Premium Professional SG	HP Acrylic B66w651 Semi-Gloss	7000 Acriglo Semi Gloss	147

3.10 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with Section 01 50 13.
- B. Set aside extra paint for future color matches, or reuse by Owner. Habitat for Humanity, etc. Where paint recycling is available, collect all waste paint by type and provide for delivery to recycling or collection facility.
- C. Close and seal tightly all partly used paint and finish containers and store protected in well-ventilated fire-safe area at moderate temperatures.
- D. Place empty containers of solvent based paints in areas designated for hazardous materials.
- E. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.

END OF SECTION

**SECTION 09960
DRYVIT TEXTURED ACRYLIC FINISHES**

PART I GENERAL

1.01 SUMMARY

- A. This document is to be used in preparing specifications for projects utilizing Dryvit Textured Acrylic Finishes Option 1 and Option 2
- B. Related Sections
 - 1. Unit Masonry – Section 04200.
 - 2. Concrete – Sections 03300 and 03400.
 - 3. Light Gauge Cold Formed Steel Framing – Section 05400
 - 4. Wood Framing – Section 06100
 - 5. Sealants – Section 07900
 - 6. Flashing – Section 07600

1.02 REFERENCES

- A. Section Includes:
 - 1. ASTM B 117 (Federal Test Standard 141A Method 6061) Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 2. ASTM C 67 Test Method for Sampling and Testing Brick and Structural Tile.
 - 3. ASTM C 150 Standard Specification for Portland Cement.
 - 4. ASTM C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions.
 - 5. ASTM C 578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - 6. ASTM D 968 (Federal Test Standard 141A Method 6191) Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
 - 7. ASTM D 2247 (Federal Test Standard 141A Method 6201) Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
 - 8. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
 - 9. ASTM D 4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
 - 10. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 11. ASTM E 96 Standard Test Method for Water Vapor Transmission of Materials.
 - 12. ASTM E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 - 13. ASTM E 2098 (Formerly EIMA Method 105.01) Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish Systems (EIFS) after Exposure to Sodium Hydroxide Solution.
 - 14. ASTM G 154 Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.
 - 15. ASTM G 155 (Federal Test Standard 141A Method 6151) Standard Practice for Operating-Xenon Arc Light Apparatus, for Exposure of Nonmetallic Materials.
 - 16. DSC151, Custom Brick™ Polymer System Specifications For Use On Vertical Walls.
 - 17. DSC152, Dryvit Cleaning and Recoating.
 - 18. DSC153, Expansion Joints/Sealants.
 - 19. DSC159, Dryvit Water Vapor Transmission.
 - 20. DSC193, Dryvit ICF Finish System Details.
 - 21. DSC194, Dryvit ICF Finish System Specifications.
 - 22. DSC204, Dryvit Outsulation® System Application Instructions.
 - 23. DSC456, Rapidry DM™ 35-50 or DSC457, Rapidry DM™ 50-75 Data Sheets.
 - 24. EIMA Method 101.01 Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation Finish Systems (EIFS), Class PB.
 - 25. EIMA Method 101.86 Standard Test Method for Resistance of Exterior Insulation Finish Systems (EIFS), Class PB to the Effects of Rapid Deformation (Impact).
 - 26. ICC ES AC219 Exterior Insulation and Finish Systems.

1.03 DEFINITIONS

- A. Contractor: The contractor that applies materials to the substrate.

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- B. Dryvit: Dryvit Systems Canada, the manufacturer of the coating materials, a Canadian corporation.
- C. Lamina: The layer consisting of the reinforced base coat and finish materials.
- D. Finish: An acrylic based finish, available in a variety of textures and colors, which is applied to the prepared wall surface.
- E. Reinforced Base Coat: The layer consisting of fiberglass reinforcing mesh fully embedded in the base coat material applied to the outside surface of the substrate.
- F. Reinforcing Mesh: Glass fiber mesh used to reinforce the base coat.
- G. Substrate: The material to which Dryvit TAFS are applied.

1.04 DESCRIPTION

- A. Dryvit TAFS are exterior architectural coatings and are available in two configurations:
 - 1. Dryvit TAFS Option 1 consists of a Dryvit acrylic primer and Dryvit finish applied to various substrates.
 - 2. Dryvit TAFS Option 2 consists of a Dryvit base coat, Dryvit reinforcing mesh, Dryvit acrylic primer (when specified) and Dryvit acrylic finish applied to various substrates.
- B. Design Requirements
 - 1. Acceptable surfaces for Dryvit Textured Acrylic Finishes include:
 - a. Poured-in-place and precast concrete.
 - b. Unglazed brick and masonry units.
 - c. Cement plaster.
 - d. Insulated Concrete Forms (ICF'S) (TAFS Option 2 only) – Refer to Dryvit ICF specification (DSC194).
 - e. EPS surfaced panels (TAFS Option 2 only) meeting ASTM C 578 Type I Properties.
 - 2. Deflection of substrate systems shall not exceed 1/240 times the span.
 - 3. Substrate systems shall be designed to meet all local building code requirements and shall be approved for use on this project.
 - 4. Vapor Retarders – The use and location of vapor retarders within a wall assembly is the responsibility of the project designer and shall comply with local building code requirements. The type and location shall be noted on the project drawings and specifications. Vapor retarders may be inappropriate in certain areas and can result in condensation within the wall assembly. Refer to Dryvit Publication DSC159 for additional information.
 - 5. Projecting surfaces shall have a minimum slope of 6:12 and maximum length of 305 mm (12 in).
 - 6. The substrate shall be clean, smooth, planar and free of surface imperfections that would interfere with application of a surface coating.
 - 7. TAFS shall be terminated a minimum of 200 mm (8 in) above finished grade.
 - 8. Dark Colors – For application over EPS, the use of dark colors must be considered in relation to wall surface temperature as a function of local climatic conditions. Use of dark colors in high temperature climates can affect the performance of the EPS substrate.
 - 9. Sealants
 - a. Shall be manufactured and supplied by others.
 - b. Shall be compatible with Dryvit TAFS materials. Refer to current Dryvit publication DSC153 for listing of sealants tested by sealant manufacturers for compatibility.
 - c. The sealant backer rod shall be closed cell.

C. Performance Requirements: As a minimum the Dryvit materials shall be tested as follows:

1. Durability:

TEST	TEST METHOD	CRITERIA	RESULTS
Abrasion Resistance	ASTM D 968	No deleterious effects after 500 liters (528 quarts)	No deleterious effects after 1000 liters (1056 quarts)
Accelerated Weathering	ASTM G 155 Cycle 1	No deleterious effects after 2000 hours	No deleterious effects after 5000 hours
	ASTM G 154 Cycle 1 (QUV)		No deleterious effects after 5000 hours
Freeze-Thaw	EIMA 101.01	No deleterious effects after 60 cycles	Passed - No deleterious effects after 90 cycles
	ASTM C 67 modified	No deleterious effects after 60 cycles	Passed - No deleterious effects after 60 cycles
	ICC ES Procedure	No deleterious effects after 10 cycles	Passed - No deleterious effects after 10 cycles
Mildew Resistance	ASTM D 3273	No growth during 28 day exposure period	No growth during 60 day exposure period
Moisture Resistance	ASTM D 2247	No deleterious effects after 14 days exposure	No deleterious effects after 42 days exposure
Taber Abrasion	ASTM D 4060	N/A	Passed 1000 cycles
Salt Spray Resistance	ASTM B 117	No deleterious effects after 300 hours exposure	No deleterious effects after 1000 hours exposure
Water Penetration***	ASTM E 331 ICC ES (AC219)	No water penetration beyond the inner-most plane of the wall after 2 hours at 300 Pa (6.24 psf)	Passed
Alkali Resistance of Reinforcing Mesh	ASTM E 2098 (formerly EIMA 105.01)	> 21dN/cm (120 pli) retained tensile strength after exposure	Passed
Water Vapor Transmission	ASTM E 96	Vapor permeable	EPS 5 perm-inch Base Coat* 40 Perms Finish** 40 perms
* Based on Dryvit Genesis® ** Based on Dryvit Quarzputz® *** TAFS Option 2			

2. Impact Resistance: In accordance with EIMA Standard 101.86

Reinforcing Mesh/Weight g/m ² (oz/yd ²)	Minimum Tensile Strengths	EIMA Impact Classification	EIMA Impact Range		Impact Test Results	
			Joules	(in-lbs)	Joules	(in-lbs)
Standard - 146 (4.3)	27 g/cm (150 lbs/in)	Standard	3-6	(25-49)	4	(36)
Standard Plus™ - 203 (6)	36 g/cm (200 lbs/in)	Medium	6-10	(50-89)	6	(56)
Intermediate® - 407 (12)	54 g/cm (300 lbs/in)	High	10-17	(90-150)	12	(108)
Panzer® 15 * - 509 (15)	71 g/cm (400 lbs/in)	Ultra High	>17	(>150)	18	(162)
Panzer 20 * - 695 (20.5)	98 g/cm (550 lbs/in)	Ultra High	>17	(>150)	40	(352)
Detail→ Short Rolls - 146 (4.3)	27 g/cm (150 lbs/in)	n/a	n/a	n/a	n/a	n/a
Corner Mesh™ - 244 (7.2)	49 g/cm (274 lbs/in)	n/a	n/a	n/a	n/a	n/a
*Shall be used in conjunction with Standard Mesh Values based on testing over EPS substrate						

3. Fire performance

TEST	TEST METHOD	CRITERIA	RESULTS
Flame Spread	ASTM E 84	All components shall have a Flame Spread Index \leq 25 Smoke Developed Index $<$ 450	Passed

1.05 SUBMITTALS

- A. Product Data: The contractor shall submit to the owner/architect manufacturer's product data sheets describing products, which will be used on the project.
- B. Samples: The contractor shall submit to the owner/architect two samples of each finish, texture, and color to be used on the project. The same tools and techniques proposed for the actual installation shall be used to prepare the samples. Samples shall be of sufficient size to accurately represent each color and texture to be utilized on the project.
- C. Test Reports: When requested, the contractor shall submit to the owner/architect copies of selected test reports verifying the performance of the system materials.

1.06 QUALITY ASSURANCE

A. Qualifications

- 1. Manufacturer: Shall be Dryvit Systems Canada. All materials shall be manufactured or sold by Dryvit and shall be purchased from Dryvit or its authorized distributor.
 - a. Materials shall be manufactured at a facility covered by a current ISO 9001:2000 certification. Certification of the facility shall be done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).
- 2. Contractor: Shall be knowledgeable in the installation of the Dryvit materials and shall be experienced and competent in the application of Dryvit Textured Acrylic Finishes. Additionally, the contractor shall possess a current trained contractor certificate** from Dryvit for any of its Exterior Insulation and Finish Systems.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. All Dryvit materials shall be delivered to the job site in the original, unopened packages with labels intact.
- B. Upon arrival, materials shall be inspected for physical damage, freezing, or overheating. Questionable materials shall not be used.
 - 1. Materials shall be stored at the job site in a cool, dry location, out of direct sunlight, protected from weather and other sources of damage. Minimum storage temperature shall be as follows:
 - a. Demandit®, Revyvite®: 7 °C (45 °F)
 - b. Ameristone™, TerraNeo® and Limestone™: 10 °C (50 °F)
 - c. DPR, PMR™ and E Finishes™, Color Prime™, Primus®, Genesis, and NCB™: 4 °C (40 °F)
 - d. Custom Brick Finish: Refer to Custom Brick Polymer Specification DSC151
 - e. For other products, refer to specific product data sheet.
 - 2. Maximum storage temperature shall not exceed 38 °C (100 °F). **NOTE: Minimize exposure of materials to temperatures over 32 °C (90 °F). Finishes exposed to temperatures over 43 °C (110 °F) for even short periods may exhibit skinning, increased viscosity and should be inspected prior to use.**
- C. Protect all products from inclement weather and direct sunlight.

1.08 PROJECT CONDITIONS

A. Environmental Requirements

- 1. Application of wet materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.
 - 2. At the time of application, the minimum air and wall surface temperatures shall be as follows:
 - a. Demandit, Revyvite: 7 °C (45 °F)
 - b. Ameristone, TerraNeo and Limestone: 10 °C (50 °F)
 - c. DPR, PMR and E Finishes, Color Prime, Primus, Genesis, and NCB: 4 °C (40 °F)
 - d. Custom Brick Finish: Refer to Custom Brick Polymer Specification DSC151
 - e. For other products, refer to specific product data sheet.
 - 3. These temperatures shall be maintained, with adequate air ventilation and circulation, for a minimum of 24 hours (48 hours for Ameristone, TerraNeo and Limestone) thereafter, or until the products are completely dry. Refer to published product data sheets for more specific information.
- B. Existing Conditions: The contractor shall have access to electric power, clean water, and a clean work area at the location where the Dryvit materials are to be applied.

1.09 SEQUENCING AND SCHEDULING

- A. Installation of the Dryvit Textured Acrylic Finishes shall be coordinated with other construction trades.
- B. Sufficient manpower and equipment shall be employed to ensure a continuous operation, free of cold joints, scaffold lines, texture variations, etc.

1.10 LIMITED MATERIALS WARRANTY

- A. Dryvit Systems Canada shall provide a written, 10-year limited materials warranty against defective materials, upon written request. Dryvit shall make no other warranties, expressed or implied. Dryvit is not liable for incidental or consequential damages. Dryvit does not warrant workmanship.
- B. The applicator shall warrant workmanship separately. Dryvit shall not be responsible for workmanship associated with the installation of the Dryvit Textured Acrylic Finishes.

1.11 DESIGN RESPONSIBILITY

- A. It is the responsibility of both the specifier and the purchaser to determine if a product is suitable for its intended use. The designer selected by the purchaser shall be responsible for all decisions pertaining to design, detail, structural capability, attachment details, shop drawings, and the like. Dryvit has prepared guidelines in the form of specifications and product sheets to facilitate the design process only. Dryvit is not liable for any errors or omissions in design, detail, structural capability, attachment details, shop drawings, or the like, whether based upon the information prepared by Dryvit or otherwise, or for any changes which purchasers, specifiers, designers, or their appointed representatives may make to Dryvit's published comments.

1.12 MAINTENANCE

- A. Maintenance and repair shall follow the procedures noted in Dryvit Outsulation System Application Instructions, DSC204.
- B. All Dryvit products are designed to minimize maintenance. However, as with all building products, depending on location, some cleaning may be required. See Dryvit publication DSC152 on Cleaning and Recoating.
- C. Sealants, flashings and other building envelope components shall be inspected on a regular basis and repairs made as necessary.

PART II PRODUCT

2.01 MANUFACTURER

- A. All Dryvit Textured Acrylic Finishes shall be obtained from Dryvit or its authorized distributors. Substitutions or additions of materials other than specified will void the warranty.

2.02 MATERIALS

- A. Portland Cement: Shall be Type I or II, meeting ASTM C 150, white or gray in color, fresh and free of lumps.
- B. Water: Shall be clean and free of foreign matter.

2.03 COMPONENTS

- A. Base Coat (when specified) (required with TAFS Option 2 over EPS insulation): Shall be compatible with the substrate and reinforcing mesh(es).
 - 1. Cementitious: A liquid polymer based material, which is field mixed in a 1:1 ratio by weight with Portland cement.
 - a. Shall be Primus or Genesis.
 - 2. Ready mixed: A dry blend cementitious, co-polymer based product, field mixed with water.
 - a. Shall be Primus[®] DM, Genesis[®] DM, Genesis[®] DMS, Rapidry DM 35-50 or Rapidry 50-75.
 - 3. Noncementitious: A factory-mixed, fully formulated, water-based product.
 - a. Shall be NCB.
- B. Reinforcing Mesh(es) (when specified) (required with TAFS Option 2 over EPS insulation): Shall be a balanced open weave, glass fiber fabric treated for compatibility with other TAFS materials. **NOTE: Reinforcing meshes are classified by impact resistance and specified by weight and tensile strength as listed in Section 1.04.C.2.**
 - 1. Shall be Standard, Standard Plus, Intermediate, Panzer 15, Panzer 20, Detail and Corner Mesh.
- C. Primers and Adhesion Promoter
 - 1. Color Prime: Pigmented, acrylic based primer used to improve adhesion and uniformity of finish color.
 - 2. Primer with Sand[™]: Pigmented acrylic based primer with sand improves adhesion and uniformity of finish color as well as application of trowel-applied finishes.
 - 3. Color Prime-W[™]: A water based acrylic, semi transparent primer for use over cement plaster and other cementitious substrates. **NOTE: Because it is semi transparent, tinted colors are affected by the color of the substrate.**
 - 4. Prymit[®]: Acrylic based adhesion promoter for use over previously painted surfaces.
- D. Finish: Shall be the type, color and texture as selected by the architect/owner and shall be one or more of the following:

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1. Standard DPR (Dirt Pickup Resistance): Water-based, acrylic coating with integral color and texture and formulated with DPR chemistry:
 - a. Quarzputz® DPR: Open-texture.
 - b. Sandblast® DPR: Medium texture.
 - c. Freestyle® DPR: Fine texture.
 - d. Sandpebble® DPR: Pebble texture.
 - e. Sandpebble® Fine DPR: Fine pebble texture.
2. **E**: Water-based, lightweight acrylic coating with integral color and texture and formulated with DPR chemistry:
 - a. Quarzputz® **E**
 - b. Sandpebble® **E**
 - c. Sandpebble® Fine **E**
3. Specialty: Factory mixed, water-based acrylic:
 - a. Ameristone: Multi-colored quartz aggregate with a flamed granite appearance.
 - b. Stone Mist®: Ceramically colored quartz aggregate.
 - c. Custom Brick Polymer Finish: Acrylic polymer-based finish used in conjunction with a proprietary template system to create the look of stone, brick, slate or tile.
 - d. TerraNeo: 100% acrylic-based finish with large mica chips and multi-colored quartz aggregates.
 - e. Limestone: A premixed, 100% acrylic-based finish designed to replicate the appearance of limestone blocks.
4. Elastomeric DPR (Dirt Pickup Resistance): Water-based elastomeric acrylic coating with integral color and texture and formulated with DPR chemistry:
 - a. Weatherlastic® Quarzputz
 - b. Weatherlastic® Sandpebble
 - c. Weatherlastic® Sandpebble Fine
 - d. Weatherlastic® Adobe
5. Medallion Series PMR (Proven Mildew Resistance): Water-based acrylic coating with integral color and texture and formulated with PMR chemistry:
 - a. Quarzputz® PMR
 - b. Sandblast® PMR
 - c. Freestyle® PMR
 - d. Sandpebble® PMR
 - e. Sandpebble® Fine PMR
6. Coatings and Sealers:
 - a. Demandit
 - b. Weatherlastic® Smooth
 - c. Tuscan Glaze™
 - d. Revyvit
 - e. SealClear™

PART III EXECUTION

3.01 EXAMINATION

- A. Prior to application of Dryvit TAFS, the contractor shall ensure that the substrate is of a type listed in Section 1.04.B.1
- B. Prior to the installation of Dryvit TAFS, the architect or general contractor shall insure that all needed flashings and other waterproofing details have been completed, if such completion is required prior to the application of Dryvit TAFS.
- C. The contractor shall notify the general contractor and/or architect and/or owner of all discrepancies. Work shall not proceed until discrepancies have been corrected.

3.02 SURFACE PREPARATION

- A. The substrates shall be prepared so as to be free of foreign materials such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellents, moisture, frost and any other materials that inhibit adhesion.
- B. Concrete and masonry
 1. Shall be dry and cured a minimum of 28 days.
- C. ICF (Insulated Concrete Forms) (TAFS Option 2 is required)
 1. Refer to ICF Specifications (DSC194) and ICF Details (DSC193).
 2. All gaps between ICF blocks shall be slivered with pieces of EPS.
 3. The entire surface of the EPS shall be rasped to remove any UV degradation and provide a smooth, level surface for TAFS Option 2.
- D. EPS Surfaced Panels (TAFS Option 2 is required)

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1. EPS shall meet the requirements of ASTM E 2430 and Dryvit specification DSC131.

2. All gaps between EPS pieces shall be slivered with pieces of EPS.
 3. The entire surface of the EPS shall be rasped to remove any UV degradation and provide a smooth, level surface for TAFS Option 2.
 4. EPS shall be properly supported by and attached to the substrate.
- E. Cement Plaster
1. Plaster shall be dry and cured a minimum of 28 days.
 2. Plaster shall be floated using a wood or hard rubber float to ensure a surface with adequate "tooth" for the finish application. **NOTE: Floating to an excessively smooth surface is not recommended and may result in cracking or poor adhesion of the finish coat.**
- F. Exterior Cement and Calcium Silicate Boards (without joints)
1. Board surfaces shall be clean, dry and free of dust or other contaminants.
 2. All fasteners shall be corrosion resistant and installed in a manner as to be flush with the surface of the board.
- G. Painted Surfaces
1. Shall be cleaned to remove all loose paint, dirt, dust, chalk, and any other materials that may inhibit adhesion.
 2. Glossy surfaces shall be sanded to remove gloss and cleaned.
 3. Test patches, located in inconspicuous areas should be prepared to verify adhesion. A minimum of one test every 46 m² (500 sq. ft.) of wall area is recommended.
 4. Application of Prymit is recommended for glossy and excessively chalked surfaces.

3.03 INSTALLATION

A. The Dryvit materials shall be mixed and applied in accordance with current Dryvit printed product data sheets.

B. Masonry Surfaces

1. Apply a continuous layer of Genesis or Genesis DM mixture over the entire wall surface to fill voids and provide a smooth level base for primer and finish application. Application thickness shall not exceed 3 mm (1/8 in) in a single pass.
2. When specified, a layer of reinforcing mesh is embedded into the wet base coat mixture and troweled smooth.
3. Allow the base coat mixture to cure a minimum of 24 hours until completely dry. Cool, humid conditions may require longer cure times.
4. Using a brush, roller, or airless spray equipment, apply a coat of Color Prime or Primer with Sand over the dry base coat surface, and allow to dry.
5. Apply the specified finish in accordance with Dryvit's printed installation instructions.

C. ICF (Insulated Concrete Forms) (TAFS Option 2 only)

1. Refer to printed Dryvit ICF Specifications (DSC194) and ICF Details (DSC193).
2. When specified, high impact meshes shall be installed at ground level, high traffic areas, and other areas exposed to or susceptible to impact damage.

D. Cement Plaster, Poured in Place and Precast Concrete Surfaces

1. When specified, apply a continuous layer of Genesis or Genesis DM mixture over the entire wall surface to fill small voids and provide a smooth level base for primer and finish application. Application thickness shall not exceed 3 mm (1/8 in) in a single pass.
2. When specified, a layer of reinforcing mesh is embedded into the wet base coat mixture and troweled smooth.
3. Allow the base coat to cure a minimum of 24 hours until completely dry. Cool, humid conditions may require longer cure times.
4. Using a brush, roller, or airless spray equipment, apply a coat of Color Prime or Primer with Sand over the dry base coat or cleaned substrate, and allow to dry.
5. Apply the specified finish in accordance with Dryvit's printed installation instructions for the specific finish being used.

E. EPS Surfaced Panels (TAFS Option 2 only)

1. Dryvit reinforced base coat shall be applied in accordance with current Dryvit Outsulation System Application Instructions DSC204.
2. Apply a continuous layer of base coat and reinforcing mesh over the entire EPS surface in accordance with published instructions for the specific base coat being used.
3. All EPS terminations shall be encapsulated with reinforced base coat.
4. When specified, high impact meshes shall be installed at ground level, high traffic areas, and other areas exposed to or susceptible to impact damage.
5. Allow the base coat mixture to cure a minimum of 24 hours until completely dry. Cool, humid conditions may require longer cure times.
6. Apply the specified finish in accordance with Dryvit's printed installation instructions for the specific finish being used.

F. Exterior Cement and Calcium Silicate Boards (without joints)

1. When specified, apply a continuous layer of Genesis over the sheathing face and embed a layer of reinforcing mesh into the wet base coat mixture such that the entire surface of the board is covered.

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2. Allow the base coat to cure a minimum of 24 hours until completely dry. Cool, humid conditions may require longer cure times.
3. If base coat is not specified, using a brush, roller, or airless spray equipment, apply a coat of Color Prime Color Prime-W, or Primer with Sand over the face of the sheathing board and allow to dry.
4. Apply the finish in accordance with Dryvit's printed installation instructions for the specified finish.

G. Painted Surfaces

1. When specified, using a brush, roller, or airless spray equipment, apply a coat of Prymit over the prepared surface, and allow to dry.
2. Apply the finish in accordance with Dryvit's printed installation instructions for the specified finish.

NOTE: It is not recommended to skim painted surfaces with a cementitious base coat material.

- H. When specified, the base coat shall be applied such that the overall minimum thickness shall be sufficient to fully embed the mesh. The recommended method is to apply the base coat in two (2) passes.
- I. Sealant shall not be applied directly to textured finishes or base coat surfaces. Base coat surfaces which will be in direct contact with sealant shall be coated with Demandit or Color Prime.

3.04 FIELD QUALITY CONTROL

- A. The contractor shall be responsible for the proper application of Dryvit TAFS.
- B. Dryvit assumes no responsibility for on-site inspections or application of its products.
- C. If required, the contractor shall certify in writing the quality of work performed relative to the substrate system, details, installation procedures, workmanship and as to the specific products used.
- D. If required, the sealant contractor shall certify in writing that the sealant application is in accordance with the sealant manufacturer's and Dryvit's recommendations.

3.05 CLEANING

- A. All excess Dryvit materials shall be removed from the job site by the contractor in accordance with contract provisions and as required by applicable law.
- B. All surrounding areas, where Dryvit TAFS have been installed, shall be left free of debris and foreign substances resulting from the contractor's work.

3.06 PROTECTION

- A. Dryvit TAFS shall be protected from weather and other sources of damage until dry and permanent protection in the form of flashings, sealants, etc. are installed.

END OF SECTION

SECTION 12 36 61

SOLID SURFACING COUNTERTOPS

PART 1 — GENERAL

1.01 DESCRIPTION

- A. This Section includes solid surfacing countertops and backsplashes.
- B. Related Sections:
 - 1. Construction waste management and disposal is specified in Section 01 50 13.
 - 2. Architectural wood casework is specified in Section 06 41 00.
 - 3. Joint sealants are specified in Section 07 92 00.

1.02 SUBMITTALS

- A. General: Comply with Section 01 33 00.
- B. Product Data: Include product data for each product.
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
 - 1. Show full-size details, edge details, thermoforming requirements, and attachments.
 - 2. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, and other items installed in solid surface.
- D. Samples:
 - 1. For each type of product indicated.
 - a. Furnish minimum 6-inch by 6-inch sample in specified gloss.
 - b. Cut sample and seam together for representation of inconspicuous seam.
 - c. Indicate full range of color and pattern variation.
 - 2. Approved samples will be retained as a standard for work.
- E. Product Certificates: For each type of product, signed by product manufacturer.
- F. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.
- G. Maintenance Data: Furnish manufacturer's care and maintenance data, including repair and cleaning instructions.
- H. Warranty.

1.03 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. Fabricator/Installer Qualifications: Work of this Section shall be by a certified fabricator/installer, certified in writing by the manufacturer.
- C. Fire Test Response Characteristics: Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame Spread Index: 25 or less.
 - 2. Smoke Developed Index: 450 or less.
- D. Job Mock-up:
 - 1. Prior to fabrication, erect sample unit to further verify selections made under sample submittals and to demonstrate the quality of materials and execution.
 - 2. Mock-up shall be of a typical countertop as directed by the Architect.
 - 3. Build the mock-up to comply with the Contract Documents and install in a location as directed by the Architect.
 - 4. Notify the Architect two weeks in advance of the date of when the mock-up will be delivered.
 - 5. Should mock-up not be approved, re-fabricate and reinstall until approval is secured. Remove rejected units from project site.
 - 6. After approval, the mock-up may become a part of the Project.
 - 7. This mock-up, once approved, shall serve as a standard for judging quality of all completed units of work.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Section 01 66 00.
- B. Do not deliver components to Project site until areas are ready for installation.
- C. Store components indoors prior to installation.
- D. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.05 WARRANTY

- A. Warrant solid surfacing countertops to be free from defects in materials and workmanship for a period of 10-years from date of Substantial Completion. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

PART 2 — PRODUCTS

2.01 MATERIALS

- A. Manufacturer, Pattern and Color: As indicated in the Finish Legend on the Drawings.
- B. Thickness: 3/4-inch unless otherwise indicated.
- C. Edge Treatment: As indicated.
- D. Backsplash: As indicated.
- E. Sidesplash: As indicated.

2.02 ACCESSORIES

- A. Joint Adhesive: Manufacturer's standard VOC-compliant one- or two-part adhesive kit to create inconspicuous, nonporous joints.
- B. Sealant: Manufacturer's standard VOC-compliant mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.

2.03 FACTORY FABRICATION

- A. Shop Assembly:
 - 1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
 - 2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints. Reinforce with strip of solid polymer material, 2-inches wide.
 - 3. Provide factory cutouts for plumbing fittings and bath accessories as indicated.
 - 4. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.

PART 3 — EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
 - 1. Provide product in the largest pieces available.

2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Exposed joints/seams shall not be allowed.
 3. Reinforce field joints with solid surface strips extending a minimum of 1-inch on either side of the seam with the strip being the same thickness as the top.
 4. Cut and finish component edges with clean, sharp returns.
 5. Rout radii and contours to template.
 6. Anchor securely to base cabinets or other supports.
 7. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
 8. Carefully dress joints smooth, remove surface scratches and clean entire surface.
 9. Install countertops with no more than 1/8-inch sag, bow or other variation from a straight line.
 10. Scribe countertops to abutting walls and other vertical surfaces.
- B. Coved Backsplashes and Sidesplashes:
1. Provide coved backsplashes and sidesplashes at walls and adjacent millwork as indicated.
 2. Fabricate radius cove at intersection of counters with backsplashes to dimensions indicated.
 3. Adhere to countertops using manufacturer's standard color-matched joint adhesive.

3.03 REPAIR

- A. Repair or replace damaged work which cannot be repaired to Architect's satisfaction.

3.04 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.

3.05 CONSTRUCTION WASTE MANAGEMENT

- A. General: Comply with the requirements of Section 01 50 13 for removal and disposal of construction debris and waste.

END OF SECTION

SECTION 26 05 00

ELECTRICAL BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Galvanized steel rigid metal conduit (RMC).
- B. PVC-coated galvanized steel rigid metal conduit (RMC).
- C. Flexible metal conduit (FMC).
- D. Liquidtight flexible metal conduit (LFMC).
- E. Electrical metallic tubing (EMT).
- F. Rigid polyvinyl chloride (PVC) conduit.
- G. Electrical nonmetallic tubing (ENT).
- H. Conduit fittings.
- I. Conduit, raceways and fittings.
- J. Wires and Cables for 600 Volts and less.
- K. Wire connections and devices.
- L. Outlet boxes.
- M. Pull and junction boxes.
- N. Disconnect Switches and Fuses
- O. Supporting Devices.
- P. Identifying Devices.
- Q. Grounding and Bonding
- R. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Submit in accordance with the requirements of Division 1 the following items:
- B. A list of conduit types indicating where each type of conduit will be used. Indicate conduit manufacturers and fittings to be used.
- C. Wires and Cables.
- D. Wiring Devices and Plates

E. Nameplates, including engraving schedules where engraved plates are specified.

F. Fused disconnect switches.

1.03 DRAWINGS

A. The drawings are diagrammatic and show the general extent and arrangement of the work required which shall be followed as closely as the actual construction site conditions and work of the other trades will permit.

1.04 QUALITY ASSURANCE

A. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

B. Coordination of the work: Contractor shall become familiar with the conditions of the job site, and with the landscape drawings, drawings of other disciplines and specifications and plan the installation of the electrical work to conform with that shown and specified so as to provide the best possible assembly of the combined work of the trades.

C. Provide as-built reproducible drawings showing all outlets with circuit numbers at each outlet and maintenance manuals for all new equipment.

D. Warranties for labor and materials - 1 year from the date of final acceptance of the work.

E. In addition to material and equipment specified, also provide all incidental materials required to effect complete installation. Such incidental materials include solders, tapes, caulking, mastics, gaskets, etc.

F. The contractor will be held responsible to have examined the site and premises and satisfied himself as to existing conditions under which he will be obligated to operate in performing his part of the work or that which will in any manner affect the work under this contract.

G. Provide wiring tests upon completion of work and make adjustments as necessary for satisfactory operation of system.

1.05 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2015.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

D. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005 (Reaffirmed 2013).

E. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.

F. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2016.

G. NEMA TC 13 - Electrical Nonmetallic Tubing (ENT); 2014.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

- J. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- K. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- M. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- N. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- O. UL 1653 - Electrical Nonmetallic Tubing; Current Edition, Including All Revisions.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT - GENERAL

- A. Materials and equipment shall be new, current models of manufacturers, Bare complete identification by manufacturer and Bare UL labels where applicable.

2.02 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.
- C. PVC-Coated Fittings:
 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.

- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.05 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.07 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- C. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- D. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

ELECTRICAL NONMETALLIC TUBING (ENT)

- E. Description: NFPA 70, Type ENT electrical nonmetallic tubing complying with NEMA TC 13 and listed and labeled as complying with UL 1653.
- F. Fittings:
 - 1. Manufacturer: Same as manufacturer of ENT to be connected.
 - 2. Use solvent-welded type fittings.
 - 3. Solvent-Welded Fittings: Rigid PVC fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; suitable for use with ENT.

2.08 CONDUCTORS

- A. Conductors for within dwelling unit and garage shall be NM cable complying with NEC Article 334.
- B. Conductors for exterior shall be soft drawn, annealed copper wire 98% conductivity bearing UL label.
- C. Insulation: Provide the following (600 volt):
- D. Type THW, XHHW insulated wire for conductors #2 or larger
- E. Type THHN/THWN for all wire smaller than #2
- F. Manufacturers: Southwire, Anaconda, Rome, General Cable, Cerro Wire, or equal.

2.09 WIRE CONNECTION

- A. Wire Joints: Wires in sizes from #18 to #8 AWG, stranded conductor, with insulation rated 105 degrees C. or less shall be joined with electrical spring connectors of three part construction incorporating a non-restricted, zinc coated steel spring enclosed in a steel shell with an outer jacket of vinyl plastic with a flexible insulating skirt.
- B. Mechanical Compression Connectors and Taps: Stranded conductors from #6 AWG to 750 Kcmil shall be joined or tapped using bolted pressure connectors having cast bronze compression bolts. Fittings shall be wide range-taking and designed to facilitate the making of parallel taps, tees, crosses or end-to-end connections. Split-bolt connectors will not be acceptable.
- C. Fixture Connections: Splice fixture wire to circuit wiring with solderless connectors as specified above in paragraph A.
- D. Terminating Lugs: Conductors from size No. 6 AWG to 750 MCM, copper, shall be terminated using tin plated hydraulically operated crimping tools and dies as stipulated by the lug manufacturer. Lugs shall be 3M "Scotchlok" series 30014, Burndy Type Ya-L series, or equal.
- E. Splicing and Insulating Tape (600 volts and below): General purpose electrical tape shall be suitable for temperatures from minus 18 degrees C to 105 degrees C, shall be black, ultraviolet proof, self-extinguishing, 7 mil thick vinyl with a dielectric strength of 10,000 volts. Apply 4 layers half-lap with 2" over-lay on each conductor.
- F. Insulating Putty (600 volts and below): Pads or rolls of non-corrosive, self-fusing, one eight-inch-thick rubber putty with PVC backing sheet. Putty shall be suitable for temperatures from minus 17.8 degrees C to 37.8 degrees C and shall have a dielectric strength of 570 volts/mil minimum.
- G. Insulating Resin: Two Part liquid epoxy resin with resin and catalyst in premeasured, sealed mixing pouch. Resin shall have a set up time of approximately 30 minutes at 21.1 degrees C and shall have thermal and dielectric properties equal to the insulation properties of the cables immersed in the resin.
- H. Terminal Strip Connectors: Terminate wire in locking tongue style, pressure type, solderless lug where applicable.
- I. Wire Connectors:
 - 1. #6 AWG and larger: Thomas and Betts "Lock-Tite", Burndey, "Quicklug" or OZ Type PT/PTC.
 - 2. #8 AWG and smaller: Scotch spring steel with insulated cap, Thomas and Betts, "STA-KON Piggy" with insulator or ideal, wire nut or wing nut type.

2.10 OUTLET BOXES

- A. Standard outlet boxes: Galvanized, die formed or drawn steel, knock-out type of size and configuration best suited to the application indicated on the plans. Minimum box size, 4 inch square by 1-1/2 inch deep, indoor use. FS cast boxes are required for outdoor use.
- B. Cast Metal Outlet Boxes: FS cast boxes are required for outdoor use. Four-inch round, galvanized cast iron alloy with threaded hubs and mounting lugs as required. Boxes shall be furnished with cast cover plates of the same material as the box and neoprene cover gaskets. Thomas and Betts, Crouse-Hinds VXF series, Appleton JBX series or equal.
- C. Conduit Outlet Bodies: Cadmium plated, cast iron alloy. Obround conduit outlet bodies with threaded conduit hubs and neoprene gasketed, cast iron covers. Outlet bodies shall be used to facilitate pulling of conductors or to make changes in conduit direction only. Splices are not permitted in conduit outlet bodies. Thomas and Betts, Crouse Hinds Form 8 Condulets, Appleton form 35 Unilets, or equal.

2.11 WIRING DEVICES:

- A. Duplex Receptacles: 20A, 125V, 3 wire, grounded, NEMA 5-15R, tamper resistant, Pass & Seymour S885TRWCC14 decorator style or equal.
- B. GFI Receptacles: 20A, 125V, 3 wire, NEMA 5-15R, tamper resistant, Pass & Seymour S1595NLTTRWCC8 or equal.
- C. Outdoor Receptacles: shall be 20A, 125V, 3-wire, NEMA 5-15R, Pass & Seymour S1595TRWCC8 with while in use cover or equal.
- D. Switches: Lighting switches shall be 20A, 3 wire. Shall be Pass & Seymour 2601-W decorator style or equal. 3-way switch shall be Pass & Seymour 2603-W or equal.
- E. Dimmer Switches: Dimmer have full-on bypass mode. Shall be Pass & Seymour 91180-W decorator style or equal. 3-way dimmer switch shall be Pass & Seymour 91183-W or equal.

2.12 PULL AND JUNCTION

- A. Sheet Metal Boxes: Use standard outlet or concrete ring boxes wherever possible; otherwise use minimum 15 gauge get metal, NEMA 1 boxes, sized to code requirements with covers secured by cadmium plated machine screws located 6 inches on centers. Circle AW Products, Hoffman Engineering Co., or equal.
- B. Cast Metal Boxes: Use standard cast malleable iron outlet or device boxes wherever possible; otherwise use cadmium plated, cast malleable iron junction boxes with bolt-on, interchangeable conduit hub plates with neoprene gaskets. Appleton RS series; Crouse Hinds RS series, or equal.

2.13 DISCONNECTS:

- A. Small Motors and Water Heaters: Provide 30A, 600V AC rated double-pole toggle switch for equipment disconnects. Switch shall be rated for 2HP motors at 120V and 5HP motors at 240V. Toggle switch shall be horsepower rated. Device shall have silver cadmium oxide contacts. Device shall be fully enclosed. Device shall have quick make, slow break design. Device shall be listed as a manual motor controller. Device shall be Bryant 30002B for interior installation and Bryant 30302B for exterior installations or equal.
- B. Large Motors: Provide switches rated from 30A to 60A. Switches shall have switch blades which are visible when the switch is OFF and the cover is open The switch operating mechanism shall be quick-make, quick-break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening action of the contacts has started. The operating handle shall be an integral part of the box, not the cover. Switch enclosures shall be rated NEMA 3R for exterior installations. Switches shall be Square D - Class 3130 or equal.

2.14 DISCONNECT SWITCHES

- A. All disconnect switches shall be heavy-duty type and have the number of poles, voltage rating, and horsepower rating as required by the motor or equipment. Disconnect switches shall be in enclosures to suit conditions, NEMA 3R for outdoor and NEMA 1 for indoor. Disconnect switches shall be fused unless otherwise noted on the drawings. As manufactured by: Square D - Class 3110, ITE Seimens, or equal.

2.15 FUSES

- A. Dual Element, Time Delay, UL Class RK5. Rejection type. Size and Voltage as indicated on equipment. Bussman, Little Fuse, or approved equal.

2.16 ELECTRICAL SUPPORTING DEVICES

- A. Concrete Fasteners: Phillips "Red-Head" or equal, self-drilling expansion type concrete anchor.
- B. Conduit Straps: Hot-dip galvanized, cast malleable iron, two-hole type strap with cast clamp-backs and spacers as required. OZ/Gedney No. 14-50G strap and #141G spacer; Efcor No. 231 strap, and No.131 spacer; or equal.
- C. Construction Channel: 1-1/2 inch by 1-1/2-inch 12 gauge galvanized steel channel with 17/32 inch diameter bolt holes, 1-1/2 inch on center, in the base of the channel. Kindorf 905 series, Unistrut P-1000-HS or equal.
- D. Cable Ties and Clamps: Thomas and Betts Co. "Ty-Raps" Panduit "Pan-Ty" or equal one piece, nylon, reusable type lashing ties.
- E. Fasteners (General): Wood screws for fastening to wood. Machine screws for fastening to steel. Toggle bolts for fastening to hollow concrete block, gypsum board, or plaster walls. Expansion anchors for attachments to pre-poured concrete.

2.17 IDENTIFYING DEVICES

- A. Nameplates: Type NP: Engraved black bakelite, 1 inch by 3-1/2 inch, 1/8-inch-high white letters, machine screw retained. For permanent identification of all switchboards, panelboards, circuit breakers in separate enclosures, motor starters, relays, time switches, disconnect switches and other cabinet-enclosed apparatus including terminal cabinets or match existing as closely as possible.
- B. Legend Plates: Type LP: Die-stamped metal legend plate with mounting hole and positioning key for attachment to panel mounted operators' devices. Engraved paint-filled characters as specified.
- C. Wire & Terminal Markers: Self-adhering, pre-printed vinyl with self-laminating wrap around strip. Markers shall be legible after termination. Brady B191 series, Thomas & Betts WSL series or equal.
- D. Conductor Phase Markers: Thomas & Betts WCPHAS series or similar in addition to colored marking as specified under this section of the specifications.

2.18 GROUNDING AND BONDING

- A. Ground Rods
- B. Manufacturer: Blackburn, Erico, or approved Equal
- C. Size: 3/4" x 10' Ground Rods
- D. Grounding Electrode Conductor, 2/0 for foundation foote, and per NEC.
- E. Grounding Well - Christy Box, Valve Box

PART 3 - EXECUTION

3.01 GENERAL

- A. General: Exact locations of distances and devices shall be taken from field measurements and approved by the architect prior to rough in.
- B. Provide all wiring connections for equipment furnished under other sections of the contract documents.

3.02 WIRE

- A. Wire Sizes: Provide no wire smaller than #12 for lighting, receptacles or other circuits. Provide stranded wire for wire larger than #10.
- B. Wiring for two circuits in bedrooms can be Southwire NM-B 2/2 or equal.
- C. Wires installed in exterior locations shall be THWN. NM-B conductors shall not be installed in exterior locations.
- D. NM-B conductors shall be installed in interior locations only.

3.03 WIRING DEVICES

- A. Receptacles:
 - 1. General Areas: General provisions for receptacles shall comply with NEC Article 210.52.A.1-2.
 - 2. Kitchen Areas: Receptacles shall be provided in compliance with NEC Article 210.52.B and 210.52.C.
 - 3. Restrooms: Receptacles shall be provided in compliance with NEC Article 210.52.D.
 - 4. Family room, dining room, living room, dens, bedrooms, sunrooms, closets and hallways shall have devices that are Arc Fault Circuit-Interrupter (AFCI) protected or have breakers that are AFCI rated per NEC article 210.12.
- B. Switches:
 - 1. Controls for lighting shall comply with 2005 Title 24 Residential Compliance Manual.

3.04 CABLE AND WIRE INSTALLATION

- A. Examination
 - 1. Verify that interior of building has been protected from weather.
 - 2. Verify that mechanical work likely to damage wire and cable has been completed.
 - 3. Verify that raceway installation is complete and supported.
 - 4. Verify that field measurements are as indicated.
- B. Preparation
 - 1. In existing conduits that will be reused, pull out existing conductors.
 - 2. Completely and thoroughly swab raceway before installing wire.
 - 3. Use 50/50 solution of Simple Green. Use CO2 to blow water and soap into conduit - let soak to break up dried out pulling compounds, then pull conductors. Pull one conductor at a time if will not pull all out together.
- C. General:

1. Conductors shall not be in conduit until all work of any nature that may cause injury is completed. Care should be taken in pulling conductors that insulation is not damaged. U.L. approved non-petroleum base and insulating type pulling compound shall be used as needed.
2. All cables shall be installed and tested in accordance with manufacturer's requirements and warranty.
3. Block and tackle, power driven winch or other mechanical means shall not be used in pulling conductors of size smaller than AWG # 1.

D. Splicing and Terminating:

1. All aspects of splicing and terminating shall be in accordance with cable manufacturer's published procedures.
2. Make up all splices in outlet boxes with connectors as specified herein with separate tails of correct color to be made up to splice. Provide at least six (6) inches of tails packed in box after splice is made up.
3. All wire and cable in panels, control centers and equipment enclosures shall be bundled and clamped.
4. Encapsulate splices in exterior outlet, junction and pull boxes using insulating resin kits. All splices for exterior equipment in pump rooms shall be made up watertight.
5. Insulate mechanical compression taps AWG # 1/0 and larger using pre-molded, snap-on insulating boots or specified conformable insulating putty overwrapped with two half-lapped layers of insulating tape.

E. Identification:

1. Securely tag all branch circuits, noting the purpose of each. Mark conductors with vinyl wrap-around markers. Where more than two conductors run through a single outlet, mark each circuit with the corresponding circuit number at the panelboard.
2. Color code conductors sized #6 and larger using specified phase color markers and identification tags.
3. All terminal strips are to have each individual terminal identified with specified vinyl markers.
4. All identification shall be legible and readable after completion of installation.

3.05 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.06 INSTALLATION OF BOXES

A. General:

1. Leave no un-used openings in any box. Install close-up plugs as required to seal openings.
2. Exposed outlet boxes and boxes in damp or wet locations shall be cast metal with gasketed cast metal cover plates.

B. Box Layout:

1. Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.
2. Install junction or pullboxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Consult wire and cable manufacturer.

3.07 INSTALLATION OF WIRING DEVICES

A. General

1. Install all devices flush mounted unless otherwise noted on the drawings. Comply with layout drawings for general locations. Consult Architect or Owner for locations that have conflict with other devices or manner not suitable for installation. Avoid place devices behind open doors.
2. Align devices horizontally and vertically. Device plates shall be aligned vertically with tolerance of 1/16". All four edges of device plates shall be in contact with the wall surface.
3. Mounting height as indicated on the drawings and according to ADA requirements.
4. Install device plates on all outlet boxes. Provide blank plates for all empty, spare, and boxes for future use.
5. Securely fasten devices into boxes and attach appropriate cover plates.
6. Caulk around edges or outdoor device plates and boxes when rough wall surfaces prevent raintight seal. Use caulking materials approved by Architect/Engineer.
7. Fireproof around opening of devices located or penetrating fire rated construction assemblies.

B. Identification

1. Label all outlets and switches. Mark each wiring device where circuits and panel supply is derived from.
2. All identification shall be legible and readable after completion of installation.

3.08 INSTALLATION OF FUSES AND DISCONNECT SWITCHES

A. Fuses shall be installed where noted on plans. Sizes are based on design data provided by air conditioning mfg. Listed or labeled equipment must be in accordance with instructions included in the listing or labeling. Be sure to observe maximum branch circuit fuse size labels.

B. Disconnect switches shall be mounted on the units. Coordinate with mechanical contractor to ensure switches are not mounted on a removable access panel.

C. Label each disconnect fuse with equipment tag as indicated in the single line diagram, or as directed.

3.09 ELECTRICAL EQUIPMENT GROUNDING

A. Ground non-current carrying metal parts of electrical equipment enclosures, frames, conductor raceways or cable trays to provide a low impedance path for line-to-ground fault current and to bond all non-current carrying metal parts together. Install a ground conductor in each raceway system in addition to conductors shown. Equipment ground conductor shall be electrically and mechanically continuous from the electrical

circuit source to the equipment to be grounded. Size ground conductors per NEC 250 unless larger conductors are shown on the drawings.

- B. Grounding conductors shall be identified with green insulation, except where a bare ground conductor is specified. Where green insulation is not available, on larger sizes, black insulation shall be used and suitably identified with green tape at each junction box or device enclosure.
- C. Install metal raceway couplings, fittings and terminations secure and tight to ensure good ground continuity. Provide insulated grounding bushing and bonding jumper where metal raceway is not directly attached to equipment metal enclosure and at concentric knockouts.
- D. Motors shall be connected to equipment ground conductors with a conduit grounding bushing and with a bolted solderless lug connection on the metal frame.
- E. Conduit terminating in concentric knockouts at panelboards, cabinets and gutters shall have insulated grounding bushings and bonding jumpers installed interconnecting all such conduits and the panelboard cabinet, gutter, etc.
- F. Performance: Measure ground resistance, 25 Ohms or less.

3.10 BONDING

- A. Bonding shall be provided to assure electrical continuity and the capacity to conduct safely any fault current likely to be imposed.
- B. Bonding shall be in accordance with NEC Article 250, Part V

3.11 WORKMANSHIP

- A. Preparation, handling, and installation shall be in accordance with manufacturer's written instructions and technical data particular to the product specified and/or accepted equal except as otherwise specified. Coordinate work and cooperate with others in furnishing and placing this work. Work to reviewed shop drawings for work done by others and to field measurements as necessary to properly fit the work.
- B. Conform to the National Electrical Contractor's Association "Standard of Installation" for general installation practice.

3.12 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 26 51 00

INTERIOR LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:

- 1. Exit signs.

- B. Related Sections:

- 1. Section 26 05 00 "Electrical Basic Materials and Methods."

1.03 DEFINITIONS

- A. BF: Ballast factor.
- B. CCT: Correlated color temperature.
- C. CRI: Color-rendering index.
- D. HID: High-intensity discharge.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 - 3. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
 - b. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

1.05 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NFPA 70.
- D. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

1.06 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.07 WARRANTY

- A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated on Drawings.

2.02 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- D. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp and ballast characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.

- c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
- d. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
- e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
- f. CCT and CRI for all luminaires.

2.03 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
 - 2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - f. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Lighting fixtures:
 - 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 - 2. Install lamps in each luminaire.
- B. Connect wiring according to Section 26 05 00 "Electrical Basic Materials and Methods."

3.02 IDENTIFICATION

- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 26 05 00 "Electrical Basic Materials and Methods."

END OF SECTION

SECTION 27 05 28

PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Hooks.
 - 4. Boxes, enclosures, and cabinets.

1.03 DEFINITIONS

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid conduit.
- C. IMC: Intermediate metal conduit.
- D. PVC: Polyvinyl chloride
- E. EMT: Electrical metallic tubing

1.04 ACTION SUBMITTALS

- A. Product data for the following:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Hooks.
 - 4. Boxes, enclosures, and cabinets.

PART 2 - PRODUCTS

2.01 METAL CONDUITS AND FITTINGS

- A. Description: Metal raceway of circular cross section with manufacturer-fabricated fittings.
- B. General Requirements for Metal Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

- 2. Comply with TIA-569-D.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. ARC: Comply with ANSI C80.5 and UL 6A.
- E. IMC: Comply with ANSI C80.6 and UL 1242.
- F. PVC-Coated Steel Conduit: PVC-coated.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
- G. EMT: Comply with ANSI C80.3 and UL 797.
- H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Set screw or compression.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- I. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS AND FITTINGS

- A. Description: Nonmetallic raceway of circular section with manufacturer-fabricated fittings.
- B. General Requirements for Nonmetallic Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
 - 2. Comply with TIA-569-D.
- C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. Rigid HDPE: Comply with UL 651A.
- E. Continuous HDPE: Comply with UL 651A.
- F. Fittings: Comply with NEMA TC 3; match to conduit or tubing type and material.
- G. Solvents and Adhesives: As recommended by conduit manufacturer.

2.03 HOOKS

- A. Description: Prefabricated sheet metal cable supports for telecommunications cable.
- B. Manufacturer or equal
 - 1. Erico nVent CADDY Cat HP J-Hook System
- C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with TIA-569-D.
- E. Stainless steel.
- F. J shape.

2.04 BOXES, ENCLOSURES, AND CABINETS

- A. Description: Enclosures for communications.
- B. General Requirements for Boxes, Enclosures, and Cabinets:
 - 1. Comply with TIA-569-D.
 - 2. Boxes, enclosures, and cabinets installed in wet locations shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for use in wet locations.
 - 3. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
 - 4. Device Box Dimensions: 4-11/16 inches square by 2-1/2 inches deep.
 - 5. Gangable boxes are allowed.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures:
 - a. Material: Plastic.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- G. Cabinets:
 - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.

5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
7. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.01 PATHWAY APPLICATION

- A. Outdoors: Apply pathway products as specified below unless otherwise indicated:
 1. Exposed Conduit: IMC
 2. Concealed Conduit, Aboveground: EMT
 3. Underground Conduit: RNC, Type EPC-80-PVC, direct buried.
 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

- B. Indoors: Apply pathway products as specified below unless otherwise indicated:
 1. Exposed, Not Subject to Physical Damage: EMT
 2. Exposed, Not Subject to Severe Physical Damage: EMT
 3. Exposed and Subject to Severe Physical Damage: IMC. Pathway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. Gymnasiums
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT
 5. Damp or Wet Locations: IMC
 6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical-fiber-cable pathway
 7. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: EMT
 8. Pathways for Concealed General-Purpose Distribution of Optical-Fiber or Communications Cable: Plenum-type, communications-cable pathway or EMT.
 9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel units in institutional and commercial kitchens and damp or wet locations.

- C. Minimum Pathway Size: 1-1/4-inch trade size for copper and aluminum cables, and 2 inches for optical-fiber cables.

- D. Pathway Fittings: Compatible with pathways and suitable for use and location.
 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.

- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

- F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.02 INSTALLATION

- A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:
 - 1. NECA 1.
 - 2. NECA/BICSI 568.
 - 3. TIA-569-D.
 - 4. NECA 101
 - 5. NECA 102.
- B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
- C. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- D. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- E. Complete pathway installation before starting conductor installation.
- F. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- G. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.
- H. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- I. Support conduit within 12 inches of enclosures to which attached.
- J. Pathways Embedded in Slabs:
 - 1. Run conduit larger than 2-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot intervals.
 - 2. Arrange pathways to cross building expansion joints at right angles with expansion fittings. Comply with requirements for expansion joints specified in this article.
 - 3. Arrange pathways to keep a minimum of 2 inches of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
- K. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT or IMC for pathways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- L. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

- M. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.
- N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.
- O. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus one additional quarter-turn.
- P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.
- Q. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
- R. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Secure pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.
- S. Install pathway-sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway-sealing fittings according to NFPA 70.
- T. Install devices to seal pathway interiors at accessible locations. Locate seals, so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service pathway enters a building or structure.
 - 3. Where otherwise required by NFPA 70.
- U. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.
- V. Expansion-Joint Fittings:
 - 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT that is located where environmental temperature change may exceed 100 deg F, and that has straight-run length that exceeds 100 feet.
 - 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 - 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s)

that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.

4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

W. Hooks:

1. Size to allow a minimum of 25 percent future capacity without exceeding design capacity limits.
2. Shall be supported by dedicated support wires. Do not use ceiling grid support wire or support rods.
3. Hook spacing shall allow no more than 6 inches of slack. The lowest point of the cables shall be no less than 6 inches adjacent to ceilings, mechanical ductwork and fittings, luminaires, power conduits, power and telecommunications outlets, and other electrical and communications equipment.
4. Space hooks no more than 5 feet O.C.
5. Provide a hook at each change in direction.

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.

AA. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

BB. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

CC. Set metal floor boxes level and flush with finished floor surface.

DD. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.03 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.04 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078400 "Firestopping."

3.05 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 27 11 00

COMMUNICATIONS RACKS AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of the structured cabling system to provide a comprehensive telecommunications infrastructure.

1.02 WORK INCLUDED

- A. Provide all labor, materials, and equipment for the complete installation of work called for in the Contract Documents.

1.03 RELATED WORK

- A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation of Enclosure as described on the Drawings and/or required by these specifications.
- B. Install Enclosure as specified by the requirements of this section and in the other related sections in Division 27.

1.04 SUBMITTALS

- A. Comply with Section 01 33 00 – Submittal Procedures.
- B. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for equipment racks and cabinets.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- C. Warranty: Submit manufacturer's standard warranty.
- D. Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.05 REFERENCES

- A. ASCE 7 – Minimum Design Loads for Buildings and Other Structures.
- B. CBC – California Building Code.
- C. EIA/TIA 310D – Cabinets, Racks, Panels and Associated Equipment.
- D. IBC – International Building Code.
- E. ISO 9001:2000 – Quality Management Systems – Requirements.

- F. NFPA 5000 – Building Construction and Safety Code.
- G. UBC – Uniform Building Code.
- H. UL – Underwriters Laboratories.

1.06 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the applicable Standards indicated in Division 27 specifications.
- B. Design, manufacture, test, and install the project's data cabling systems in accordance to industry standards, manufacturer's requirements and in accordance with NFPA 70 (National Electric Code), state codes, local codes, requirements of authorities having jurisdiction, and particularly the most recent editions of the following standards and specifications.

1.07 WARRANTY

- A. Ref Warranty Period: Product lifetime.

1.08 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 and finish during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.01 PRODUCT CONSISTENCY

- A. Product Consistency: Any given item of equipment or material shall be the product of one manufacturer throughout the facility. Multiple manufacturers of any one item will not be permitted.

2.02 GENERAL

- A. The materials and products specified herein reflect the minimum acceptable standards of fabrication and manufacturing.
- B. All materials and products supplied by the Contractor and specified herein are to be new, unused, of first quality and in original packaging or shipping containers or as shown on drawings, specified and described in this section.
- C. All products shall be a part of the provided manufacturer's cabling system.
- D. Approved manufacturers products and systems shall be technically compliant systems that include the manufacturer's system partners.

2.03 COMMUNICATIONS RACKS

- A. Communications Rack are existing. Coordinate with owner for space requirements.

2.01 RACK MOUNTED EQUIPMENT

A. Horizontal Wire Management

- 1. 2U Manager: Panduit WMPH2 or equal
 - a. All horizontal wire managers shall be heavy duty painted black metal units designed specifically to connect to equipment frames.
 - b. All wire managers shall be secured to the frames and shall provide a clear and unobstructed pathway in which to route the cables.
 - c. Each UTP patch panel will have one (1) 2RU horizontal wire manager above and below.

B. Copper Panel

- 1. 48-Port Modular Patch Panel: Panduit CPPL48WBLY or equal
 - a. Shall accommodate Cat6A cables and jacks
 - b. Mount to standard EIA 19" rack
 - c. Modular, accepting all modules designed for that product line
 - d. Available with labels that follow TIA/EIA 606 labeling standards
 - e. One patch panel port shall be provided for each station cable served from the IDF/MFD with a minimum of 12 spare ports.
 - f. Supply and install as many patch panels as necessary to service all stations cabling, plus the required spare count.

C. PoE network switches

- 1. PoE Network Switches are existing. Use existing ports dedicated to surveillance cameras and coordinate with owner for any additional allocation required.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive cable management and patch panels.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.
- C. Do not begin installation until unacceptable conditions are corrected.

3.02 ADJUSTING

- A. Adjust operating hardware to operate smoothly without binding.
- B. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

3.03 PROTECTION

- A. Protect installed cable management enclosures from damage during construction.

END OF SECTION

SECTION 27 15 00

STRUCTURED CABLING SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. UTP cabling.
 - 2. Cable Connecting Hardware, Patch Panels, and Cross-Connects.
 - 3. Telecommunications Outlet/Connectors.
 - 4. Cabling system identification products.

1.03 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
- C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- D. EMI: Electromagnetic interference.
- E. IDC: Insulation displacement connector.
- F. LAN: Local area network.
- G. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- H. RCDD: Registered Communications Distribution Designer.
- I. UTP: Unshielded twisted pair.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data sheets, including installation instructions verifying that materials comply with specified requirements and are suitable for intended application.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test each pair of UTP cable for open and short circuits.

PART 2 - PRODUCTS

2.01 HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called a "permanent link," a term that is used in the testing protocols.
 - 1. Bridged taps and splices shall not be installed in the horizontal cabling.
 - 2. Splitters shall not be installed as part of the optical fiber cabling.
- B. A work area is approximately 100 sq. ft. and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

2.02 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1 when tested according to test procedures of this standard.
- B. 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: 50 or less.
- C. 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.
- D. Grounding: Comply with J-STD-607-A.

2.03 TELECOMMUNICATIONS OUTLETS

- A. Jacks: UTP jacks shall be Panduit Category 6a Mini-Com CJ68OT3R or equal
 - 1. Provide modular type information outlets for 23-AWG copper cable. These Category connectors shall be individual snap-in style and exceed compliance with TIA/EIA-568-C specifications. The connectors shall comply with the following:
 - 2. Be 8-position/ 8-conductor (8P8C, RJ45-style) modular jacks for data and voice.
 - 3. Utilize a universal Keystone-style insertion footprint as the manufacturer's main "flagship" line of products.
 - 4. Comply with FCC Part 68; UL listed and CSA Certified.
 - 5. All plastics used in construction of the connector bodies shall be fire-retardant with a UL flammability rating of 94V-0.
 - 6. IDC posts shall employ a mechanism to allow for terminations without a complete untwist of each pair of conductors.

7. The connector shall provide a ledge directly adjacent to the 110-style termination against which the wires can be directly terminated and cut in one action by the installation craftsperson.
8. Connector wiring label shall provide installation color codes for both T568A and T568B wiring schemes on separate labels.
9. Jacks shall employ 2 or more circuitry solutions for dampening of NEXT.
10. Stenciled lettering for voice and data circuits shall be provided using thermal ink transfer process.

B. Copper Patch Panels: See Section 27 11 00 Communications Racks and Equipment

2.04 HORIZONTAL/STATION CABLING

A. The maximum fixed link cable length shall be 295 feet.

B. Provide Augmented Category 6 (Cat6a) cable for all applications.

1. Description: Four-pair, balanced-twisted pair cable, with internal spline, certified to meet transmission characteristics of Category 6a cable at frequencies up to 500MHz.
2. Standard: Comply with TIA-568-C.2 for Category 6a cables.
3. Conductors: 100-ohm, 23 AWG solid copper.
4. Shielding/Screening: Screened twisted pairs (F/UTP)
5. Cable Rating: Riser
6. Jacket: As shown on telecommunications schematic

C. Manufacturer or Engineer Approved Equal

1. Mohawk
2. Belden
3. Berk-Tek

2.05 UTP CABLE HARDWARE

A. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

B. Connecting Blocks: 110-style IDC for CAT6A. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

C. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Number of Jacks per Field: One for each four-pair UTP cable indicated.

D. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

E. Patch Cords: Factory-made, four-pair cables in lengths required; terminated with eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Augmented Category 6 performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords shall have color-coded boots for circuit identification.

2.06 GROUNDING

A. Comply with requirements in Section 26 05 00 "Electrical Basic Materials and Methods" for grounding conductors and connectors.

- B. Comply with J-STD-607-A.

2.07 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.01 WIRING METHODS

- A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal pathways and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
- B. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures:
 - 1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
 - 2. Install lacing bars and distribution spools.
 - 3. Install conductors parallel with or at right angles to sides and back of enclosure.

3.02 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 - 1. Comply with TIA/EIA-568-B.1.
 - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - 3. Install 110-style IDC termination hardware unless otherwise indicated.
 - 4. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - 5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 6. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
 - 7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
 - 8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - 9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
 - 10. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
 - 11. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
- C. UTP Cable Installation:
 - 1. Comply with TIA/EIA-568-B.2.
 - 2. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.

- D. Open-Cable Installation:
 - 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - 2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
 - 3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- E. Group connecting hardware for cables into separate logical fields.
- F. Separation from EMI Sources:
 - 1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 - 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
 - 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
 - 4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
 - 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
 - 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.03 FIRESTOPPING

- A. Comply with requirements in Section 07 84 00 "Firestopping."
- B. Comply with TIA-569-B, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.04 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.05 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements listed on plans.
- B. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.
- C. Comply with requirements in Section 09 91 00 "Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- D. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- E. Cable and Wire Identification:
 - 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
 - 4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
 - b. Label each unit and field within distribution racks and frames.
 - 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- F. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
 - 1. For cables use flexible vinyl or polyester that flex as cables are bent.

END OF SECTION

SECTION 28 20 00

VIDEO SURVEILLANCE SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Cameras.
- B. Camera Supporting Equipment.
- C. Structured Cabling.
- D. Network Equipment.
- E. Video Management System.
- F. Licensing.

1.02 RELATED REQUIREMENTS

- a. Section 27 05 28 Pathways for Communications Systems: includes pathway requirements for VSS.
- b. Section 27 11 00 Communications Racks, Frames, and Enclosures: includes requirements for PoE network switches, patch panels, wire managers, and equipment racks.
- c. Section 27 15 00 Structured Cabling Systems: Includes cabling and termination requirements for VSS.

1.03 REFERENCE STANDARDS

- A. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- B. 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.
- C. Comply with NECA 1.
- D. Comply with NFPA 70.
- E. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Definitions:
 - a. B/W: Black and White.
 - b. FTP: File Transfer Protocol.
 - c. IP: Internet Protocol.

- d. LAN: Local Area Network.
- e. MPEG: Moving Picture Experts Group.
- f. NTSC: National Television System Committee.
- g. NVR: Network Video Recorder
- h. PC: Personal Computer.
- i. PTZ: Pan-Tilt-Zoom.
- j. RAID: Redundant Array of Independent Disks.
- k. TCP: Transmission Control Protocol.
- l. UPS: Uninterruptible Power Supply.
- m. VSS: Video Surveillance System
- n. WAN: Wide Area Network.

B. System Overview

- a. The VSS is a network of IP cameras connected to and managed through a video management and recording server and viewed on client workstations.
- b. The VSS consists of interior and exterior fixed IP cameras, networked video recorders, management software, and dedicated client video monitoring workstations.

C. VSS Camera System

- a. Provide VSS NVR and software capable of video motion detection.
- b. Provide the appropriate number of video licenses for IP cameras connected to the VSS video management system. Provide additional IP camera licenses for future use as prescribed in part 2.
- c. Coordinate network connection between IP cameras, video storage server, and existing security workstations with owner's IT department prior to installation.
- d. Coordinate one static IP network connection for each camera.
- e. Provide IP fixed VSS cameras as indicated on the floor plans.
- f. Coordinate field of view with exterior light sources to prevent poor image quality.
- g. Provide fiber and copper cabling for cameras as indicated on plans.
- h. Provide media converters, PoE switches, and PoE extenders as indicated on plans.
- i. Provide surge protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

1.05 SUBMITTALS

A. Action Submittals:

- a. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
- b. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.
- c. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- d. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
- e. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
- f. Wiring Diagrams: For power, signal, and control wiring.
- g. Design Data: Include an equipment list consisting of every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of

preset positions, description of alarms, and description of unit output responses to an alarm.

B. INFORMATIONAL SUBMITTALS

- a. Seismic Qualification Data: Certificates, for cameras, camera-supporting equipment, accessories, and components, from manufacturer.
- b. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- c. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
- d. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- e. Field quality-control reports.
- f. Product Warranty: Sample of special warranty.

C. CLOSEOUT SUBMITTALS

- a. Operation and Maintenance Data: For cameras, power supplies, video switches, and control-station components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
- b. Lists of spare parts and replacement components recommended to be stored at the site for ready access.

1.06 QUALITY ASSURANCE

A. Licensure:

- a. Contractor or security sub-contractors shall be licensed to perform security installations in California.

B. Experience:

- a. Contractor or security sub-contractor shall have a minimum of five years of experience installing and servicing systems of similar scope and complexity.

C. Qualifications:

- a. Cabling Installer must have personnel certified by BICSI on staff.
- b. Layout Responsibility: Preparation of Shop Drawings by an RCDD.
- c. Installation Supervision: Installation shall be under the direct supervision of Registered Technician Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
- d. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- e. Surveillance Camera Installer/integrator: Must have completed the VIVOTEK Expert Certificate (VEC) program.
- f. NVR installer/integrator: Must have been trained by Milestone to install, program, and service VMS equipment.

D. Testing Agency Qualifications: An NRTL.

- a. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

E. Contractor Responsibilities:

- a. All software and camera installations, configuration, setup, programming, and related work shall be performed by software/electronic technicians thoroughly trained by the manufacturer in the installation and service of the equipment provided.
- b. Contractor shall submit certifications from the manufacturer of the equipment from the last two years of the highest level of training provided.

- c. Contractor shall have 24/7/365 service technicians and be a stocking contractor of the manufacturer's equipment. The integrator shall be able to respond to a service call on site and have trained resources within 60 miles of the owner's location.
- d. The integrator's main resources within the project shall carry proper certification issued by the manufacturer and provide recent certifications to confirm sufficient product and technology knowledge.
- e. The integrator shall follow the installation instructions provided by the manufacturer to ensure the system is designed, calculated, and installed per the manufacturer's recommendations.
- f. The database shall be reviewed by the owner and approved before the integrator enters it into the system.
- g. All equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to tested and training of the owner.
- h. All firmware in the products shall be the latest and most up-to-date provided by the manufacturer, or of a version as specified by the provider of the Video Management System to ensure approved integration compatibility
- i. A proper installation shall meet NEC per the guidelines of that year's revision and the local authority having jurisdiction when properly installed equipment meets low voltage, class 2 classification of the NEC.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - a. Test each pair of UTP cable for open and short circuits.

1.08 WARRANTY

- A. Special Warranty:
 - a. Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.
 - b. Warranty Period: Two years from date of Substantial Completion.

- B. Maintenance and Service:
 - a. General Requirements
 - b. Provide all services required and equipment necessary to maintain VMS in an operational state as specified for one year from formal written acceptance of system.
 - c. Provide all necessary material required for performing scheduled adjustments or other non-scheduled work.
 - d. Minimize impacts on facility operations when performing scheduled adjustments or other non-scheduled work
 - e. Description of Work: Deployment of VMS includes installation and setup of new server hardware and software.
 - f. Personnel: Service personnel shall be certified in the maintenance and repair of the selected type of equipment and integrations, and qualified to accomplish all work promptly and satisfactorily.
 - g. Schedule of Work: Work shall be performed during regular workweek working hours, as determined by the deployment facility's locale, excluding federal/public holidays.
 - h. Emergency Service:
 - i. Provide Owner with an emergency service center telephone number. Emergency service center shall be staffed 24 hours a day, 365 days a year and be located within 60 miles/kilometers of the deployment facility.
 - j. Be a stocking contractor of the manufacturer's equipment.
 - k. Owner shall initiate service calls whenever system is not functioning properly.
 - l. Service Response:

- 1) Owner has sole authority for determining catastrophic and non-catastrophic system failures.
 - 2) Catastrophic system failure is defined as any system failure that Owner determines will place a facility at increased risk.
 - 3) For catastrophic system failures, provide same-day four-hour service response with continued status updates at least every four hours.
 - 4) For non-catastrophic failures, provide service response within eight hours with continued status updates at least twice a week.
- m. Verification of Operation: As part of scheduled adjustments and repairs, verify operation of system as demonstrated by performance verification testing.

PART 2 - PRODUCTS

2.01 CAMERAS

A. GENERAL REQUIREMENTS

- a. Provide surveillance cameras per plans and schedules. Coordinate exact locations and viewing areas with owner.
- b. All cameras shall be IP-based and powered via Power over Ethernet (PoE).
- c. Manufacturer shall be Vivotek, Inc.

B. 2MP Fixed Dome

- a. Model: Vivotek FD8369A-V
- b. Or engineer approved equal

C. 12MP Panoramic Dome, 4-Sensor

- a. Model: Vivotek MA8391-ETV
- b. Or engineer approved equal

2.02 CAMERA-SUPPORTING EQUIPMENT

A. General Requirements

- a. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.
- b. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions.

B. Adapter Plate

- a. Model: Vivotek AM-51D
- b. Or engineer approved equal

C. Wall Mount Bracket

- a. Model: Vivotek AM-21C
- b. Or engineer approved equal

D. Corner Mount Adapter

- a. Model: Vivotek AM-414
- b. Or engineer approved equal

2.03 STRUCTURED CABLING

- A. The maximum fixed link cable length shall be 290 feet.

- B. At device location, provide flying lead RJ45 connector within backbox. Connect to camera with patch cable.
- C. See Section 27 15 00 Structured Cabling Systems for cabling and termination requirements.

2.04 NETWORK EQUIPMENT

- A. PoE Network Switches
 - a. See Section 27 11 00 Communications Racks, Frames, and Enclosures for PoE network switches.

2.05 VIDEO MANAGEMENT SYSTEM (VMS)

- A. Existing server hardware and software provided during Increment 3, DSA 01-116833.

2.06 LICENSING

- A. Camera License:
 - a. Contractor shall provide owner with (1) one Milestone XProtect Professional Plus licenses per camera.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.
- B. Examine roughing-in for LAN, WAN, and IP network before device installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 WIRING

- A. Wiring Method: Install cables in conduits unless otherwise indicated.
- B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- C. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.03 VIDEO SURVEILLANCE SYSTEM INSTALLATION

- A. Install cameras level and plumb.
- B. Provide 84-inch-minimum clear space below cameras and their mountings. Coordinate with Owner and change height and type of mounting to achieve best view.
- C. Exposed conduit, boxes, cameras, and related items shall be painted to match adjacent surfaces. Painting shall be coordinated with architect.

3.04 SYSTEM TESTING AND ACCEPTANCE

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:
 - a. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
 - b. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:
 - c. Prepare equipment list described in "Informational Submittals" Article.
 - d. Verify operation of auto-iris lenses.
 - e. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
 - f. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
 - g. Set and name all preset positions; consult Owner's personnel.
 - h. Set sensitivity of motion detection.
 - i. Connect and verify responses to alarms.
 - j. Verify operation of control-station equipment.
 - k. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.
- E. Pre-test and Final Testing
 - a. Facilities Project Manager and Technology Services shall be notified 72 hours prior to any and all acceptance testing of security camera systems, so monitoring of the security camera system can be initiated, and OUSD project team shall be scheduled to attend the testing.
 - b. Facilities Project Manager and Technology Services shall always be present and participate in all testing whether it is pre-test or final acceptance test. Verification of camera, labels and device addresses shall be made via Service Ticketing Email System and confirmed with the vendor, Facilities Project Manager, or Technology Services during the testing.
 - c. Prior to the final acceptance test, the vendor shall perform a complete pre-test with the Facilities Project Manager and Technology Services. The pre-test shall be for all security camera equipment and testing records of the pre-test shall be provided to ensure a successful final acceptance test. As part of the completion of work on the security camera systems, a full documented test of all the components on the security camera system shall be performed. A representative from the OUSD project team shall be present for the test. Any deficiencies reported by the district representatives and/or district consultant shall be corrected and retested prior to calling for the final inspection. As part of the testing, the vendor shall provide the

OUSD project team with a points list of all the devices to be tested. A record set of approved plans shall also be available on site during the testing for reference.

- d. If the pre-test is successful, at the discretion of the Facilities Project Manager and Technology Services, the pre-test may be considered the final acceptance test.
- e. Prior to any final acceptance test, the Facilities Project Manager and Technology Services must be sent an email listing the total number of new cameras installed, and the number of existing cameras prior to the start of the final acceptance test. For any final acceptance test that is scheduled after working hours or weekends, the vendor must perform a pre-test of the system during a time when the Facilities Project Manager and Technology Services are able to verify the receipt of the camera signals at the time of pre-testing.
- f. System acceptance tests shall not be performed until the initial system commissioning has been completed. The system acceptance tests shall be supervised by the Facilities Project Manager, Technology Services, and the vendor and shall consist of the following:
 - g. Take a physical inventory of all equipment and materials on site and compare to equipment lists in the contract documents.
 - h. Demonstrate the operation of all system equipment.
 - i. Application tests will be required to determine compliance and interoperability with core network-based applications.
 - j. In the event further adjustment is required, or defective equipment must be repaired or replaced, tests may be suspended or continued at the option of the vendor.
- k. If acceptance of the system is delayed because of defective equipment or because the equipment does not fulfill this specification, reimburse the Owner for all time and expenses of the vendor for these tests during any extensions of the acceptance-testing period.
- l. If the security camera installation or modification is in "phased" stages or if there are substantial corrections and additions to the scope of the project, then the Contractor shall assume responsibility for subsequent testing and retesting of the security camera system installation. After the last phase of the security camera system has been completed and tested totally, ten percent of the previously completed phases are to be tested with the final test phase.
- m. Punch list items are allowed on issues that do not create safety issues, such as hardware or software failures, any trouble conditions, equipment failures, or for items that do not affect a fully operation security camera system with complete coverage in order to conduct a final acceptance test. Non-critical items such as painting and patching, demolition, access issues are examples of what may be considered as "Punch List" items.
- n. Once a security camera installation has been tested, and subsequent changes are made after the final test that affect the configuration of the original installation and scope of the project's security camera system, a new final security camera test shall be performed due to the changes of the originally installed system. Label changes do not require a new final security camera test. Only changes, such as device additions, deletions or changes to functional programming shall require a new final security camera test.

F. Acceptance & Sign-off

- a. Spare parts that are required and noted within this specification shall be delivered to the Facilities Project Manager prior to scheduling a final test. No final test date will be accepted until the spare parts indicated in the project specifications have been received by the Facilities Project Manager.
- b. No system troubles or equipment failures shall be present at the final acceptance testing. If there are troubles, the test shall not occur.
- c. Facilities Project Manager, Police Services, and Technology Services as the End User/Owner of these systems reserve the right to not accept any installation that does not adhere to this specification or district standards. The Vendor shall correct

all issues to the facilities Project Managers', Police Services', and Technology Services' satisfaction before they will accept the system handover.

3.05 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:
 - a. Check cable connections.
 - b. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
 - c. Adjust all preset positions; consult Owner's personnel.
 - d. Recommend changes to cameras, lenses, and associated equipment to improve Owner's use of video surveillance system.
 - e. Provide a written report of adjustments and recommendations.

3.06 CLEANING

- A. Clean installed items using methods and materials recommended in writing by manufacturer.
- B. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens.

3.07 TRAINING

- A. Contractor shall provide (2) two orientation sessions with OUSD's Police Services, Technology Services, and facility support personnel. Training sessions may last up to (4) four hours each with a minimum of (2) hours. Each session shall:
 - a. Provide an overview of the architecture and its functionality
 - b. Provide on-the-job training to designated personnel, to instruct them in the operation and maintenance of the systems.
 - c. Provide a review of as-built documentation.
 - d. Establish recommendations for effective management and maintenance of the installed VMS
 - e. Be coordinated with the equipment manufacturer, at no additional cost, in the event qualified instructors are not available on staff for the certain equipment.
 - f. Provide training on the use of the Service Ticketing Email System if the security system or a camera malfunctions or breaks.
- B. The first training session will commence within (10) ten days after final completion. The second shall occur within 1 year of final completion.

END OF SECTION

SECTION 28 31 00

INTRUSION DETECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:

- 1. Intrusion detection with communication links to perform monitoring, alarm, and control functions.

- B. Related Sections:

- 1. Section 26 05 00 "Basic Electrical Materials and Methods"

1.03 DEFINITIONS

- A. Approved: Unless otherwise stated, materials, equipment or submittals approved by the Owner, Owner's Representative or IOR.
- B. Concealed: Where used in connection with installation of piping or conduit and accessories, shall mean "hidden from sight" as in shafts, furred spaces, soffits or above suspended ceilings.
- C. Contractor: The Company awarded the prime contract for this work and any of its subcontractors, vendors, suppliers or fabricators.
- D. DSA: Division of the State Architect.
- E. IACP: Intrusion Alarm Control Panel.
- F. IOR: Inspector of Record.
- G. Listed: Materials or equipment included in a list published by a nationally recognized laboratory that maintains periodic inspection of production of listed equipment and material, and whose listing states either that the equipment or materials meets nationally recognized standards or has been tested and found suitable for use in a specified manner.
- H. PIR: Passive Infrared.
- I. POPIT: Point of protection input transponder.
- J. POPEX: Point of protection expansion module
- K. RFI: Radio-frequency interference.
- L. UL: Underwriters' Laboratories, Inc.
- M. UL Listed: Materials or equipment listed by Underwriters' Laboratories and included in the most recent edition of the UL Fire Protection Equipment Directory.

1.04 GENERAL AND SPECIAL CONDITIONS

- A. Vendors shall be Bosch Certified with a Bosch Certificate of Training issued by Bosch, licensed by the Board of Consumer Affairs and must meet OUSD's pre-qualification requirements in the same manner as electrical contractors working with the OUSD representative. Proof of Bosch certification shall be provided to the OUSD Project Manager and forwarded to the OUSD Alarm Shop.
- B. A Bosch-certified technician with a Bosch Certificate of Training issued by Bosch shall supervise the installation acceptable to the OUSD.
- C. Any contractor responsible for programming the Bosch panels must have Bosch's most current RPS program and must be certified for programming on the new software and panel.
- D. Any company and/or Bosch programmer hired by the general contractor to program OUSD's Bosch systems must attend required project meetings and have all required equipment to properly program and test the system with the First Alarm and OUSD Alarm Shop receiver. OUSD does not loan or provide parts needed on a project for any reason.
- E. Prior to working or expanding an existing intrusion system, the contractor shall verify the existing conditions of the system and identify any deficiencies to the OUSD Project Manager and B&G personnel. Upon reporting the deficiencies, OUSD Alarm Shop is to correct the deficiencies and contractor is to agree that the system is free of any deficiencies before starting his work. Any deficiencies thereafter will be the contractor's responsibility to correct. The existing intrusion alarm system should be free and clear of troubles prior to the contractor starting work. Any issues in the area(s) of work regarding the operation and status of the existing intrusion system and/or repairs to protect the site once work has started are the responsibility of the contractor. Once the contractor begins work, they shall be responsible for any and all repairs in the area(s) of work.
- F. If there are issues found prior to, during or after the start of work, and the contractor did not contact and identify the deficiencies to the OUSD Project Manager and B&G personnel, the contractor shall be responsible for all necessary repairs, including time for OUSD's B&G personnel to repair the deficiencies.
- G. Anytime during the project, if a trouble condition is reporting on the existing intrusion alarm system, the contractor shall be responsible for notifying B&G Alarm Shop immediately of the trouble condition, so they can review and resolve the issue(s) not related to the contractor's work.
- H. Any existing intrusion panels shall not be accessed by the contractor until it is identified and confirmed by B&G that it is an OUSD-owned panel.
- I. Project Managers shall provide to the OUSD Alarm Shop a user list for Intrusion Codes prior to going on line.
- J. Construction trailers on site requiring alarm monitoring equipment or cameras connected to a Central Station must have their own private Alarm Permit registered with the Oakland Police Department and under their own name. The use of Oakland Unified School District as the registered name is prohibited.
 - 1. The contractor shall provide the OUSD Project Manager with the alarm permit number, alarm company name and number, and supervising station phone numbers.
 - 2. Any false alarm fines billed to OUSD caused by the alarm equipment installed while on site are to be paid immediately by the contractor.

1.05 ACTION SUBMITTALS

- A. Equipment List / Product Data: Components for sensing, detecting, and control, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
 - 1. Submit full sets of product submittals bound in protective binders. A Bill of Materials shall be provided listing the part number and quantity of all components and devices. All data sheets shall

be original manufacturer's literature or shall be clearly legible if copies are provided. When a manufacturer's data sheet shows more than one product(s), the proposed product shall be clearly indicated by arrows or other suitable means.

- B. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project.
 - 1. Submit dimensioned elevation details the power supply. The contractor is responsible for the actual location of the power supply in the designated room. Complete installation drawings, including system wiring diagrams, floor plans, and point-to-point wiring diagrams showing all conductors and terminations for all systems. Intrusion alarm drawings are to be prepared in CAD. A block diagram or single-line diagram alone is not acceptable.
 - 2. Manufacturer's names, model numbers, and catalog references for all equipment supplied.
 - 3. A complete listing of all system input and output points, and a sequence of operations for all functions of each system.
 - 4. A complete Bill of Materials.
 - 5. Battery calculations for all panels and remote power supplies.
 - 6. Service information, including the address and telephone number of the nearest service representative.
 - 7. Raceway Riser Diagrams: Detail raceway runs required for intrusion detection and for systems integration. Include designation of devices connected by raceway, raceway type and size, and type and size of wire and cable fill for each raceway run.
 - 8. Site and Floor Plans: Indicate final outlet and device locations, routing of raceways, and cables inside and outside the building.
 - 9. Master Control-Unit Console Layout: Show required artwork and device identification.
 - 10. Sensor detection patterns and adjustment ranges.

1.06 CLOSEOUT SUBMITTALS

- A. The contractor shall submit spare parts in accordance with this specification.
- B. The contractor shall submit a sample of typical initiating device and typical notification appliance installation for review by the project team. Samples shall include (as applicable) standard or deep electrical box, extension ring, intrusion alarm device including dress skirts or trim plates, wire guard, etc.

1.07 QUALITY ASSURANCE

- A. This specification supersedes the manufacturer's installation requirements. If not stated directly, installation shall be as required in accordance with manufacturer's specifications and documentation provided with each unit.
- B. Installer Qualifications:
 - 1. An employer of workers, at least one of whom is a technician certified by the National Burglar & Fire Alarm Association.
 - 2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- C. Intrusion Detection Systems Integrator Qualifications: An experienced intrusion detection equipment supplier and Installer who has completed systems integration work for installations similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 FUNCTIONAL DESCRIPTION OF SYSTEM

- A. Description: This is an existing system that shall be reprogrammed to accommodate replaced or relocated devices for a building renovation. Contractor shall coordinate with owner to ensure that system is operational and free of alarm and trouble signals prior to commencement of construction. Once system is clear, contractor assumes all responsibility for working system and any issues that occur outside of the work zone.
- B. Manufacturer's catalog and system numbers of equipment listed in this specification indicate type, quality, and functions of the equipment required, and represent the minimum acceptable standards. Provide all compatible parts for the submitted system.
- C. OUSD does not permit or approve of glass break detectors or Octo-POPITs at any time.

2.02 MANUFACTURERS

- A. The acceptable manufacturer for the control units and major components shall be Bosch. This is a proprietary system and new components required to match existing OUSD intrusion alarm standard equipment requirements. No equal shall be accepted.
- B. Products shall be of the latest design; obsolete or discontinued products shall not be acceptable. All equipment supplied shall be UL listed for the required function.

2.03 INTRUSION ALARM CONTROL EQUIPMENT

- A. The main intrusion alarm control panel (IACP) and system power supplies are located in Electrical Room 2122 within the Media Building.

2.04 INTRUSION ALARM POWER SUPPLY

- A. Intrusion Alarm Power Supplies are existing to remain.

2.05 INTRUSION ALARM KEYPAD

- A. Intrusion Alarm Keypads are existing to remain.

2.06 POPIT

- A. POPITs shall be Bosch D9127U.
- B. The exact location of all POPITs shall be provided to B&G Alarm Shop.
- C. Existing POPITs shall be reused where possible and replaced when required.

2.07 DOOR CONTACTS

- A. Door Contacts are existing to remain.

2.08 WALL-MOUNTED MOTION DETECTORS

- A. Motion detectors shall be provided to protect all perimeter openings.
- B. Wall-mounted motion detectors shall be Bosch Professional Series TriTech+ with Anti-Masking; model ISC-PDL1-WA18GB. Detector shall be mounted using the Bosch B328 Gimbal-mount bracket.

- C. Each motion detector shall provide for point identification. Provide and install a POPIT for each motion detector. The POPIT shall be located at the motion detector.
- D. Provide wire guards for motion detectors in all public areas and corridors. Wire guards shall be Chase model CWGP 778, STI-9621-WEB, or STI-9623. The contractor shall confirm that the guard selected is appropriate for the application and can be installed on the motion detector or sounder (including mounting box and conduit), before installation of conduit.
- E. Wall-mounted motion detectors shall be installed at 8 feet above finished floor, measured from the bottom of the mounting box or mounting bracket. Motion detectors shall be installed with a clear view of the protected area. Motion detectors shall not be installed above shelving or in locations where coverage is obstructed (e.g., above casework). Detectors shall not be pointed directly at a window within its sensing range. Motion detectors shall not be located in corners but shall be 2 to 3 feet from corners to help eliminate spiders from making webs on the detectors.
- F. Any motion detector in the entry/exit path of travel to the location of the keypad shall be programmed with a 90-second entry/exit delay.
- G. Motion detectors shall not be installed in the path of heating/ventilation vents or drafty areas or high velocity (HVLS = Hi Volume Low Speed) ceiling fans where there is a possibility of temperature changes. Refer to the manufacturer's recommendations for installation information.
- H. Contractor shall make the necessary sensitivity adjustments in the field to minimize nuisance alarms. The use of default settings is not acceptable. The intermediate sensitivity shall not be used unless approved in writing by OUSD.
- I. Any Bosch motion detector that offers an optional "Look Down Zone" for greater security coverage is not to be adjusted for any reason. Failure to comply with this policy will require adjustments or replacement of motion detectors at the contractor's expense.
- J. Existing Motion Detectors shall be reused where possible and replaced when required.

2.09 SOUNDERS

- A. Sounders are exiting to remain.

2.10 POPEX

- A. POPEXs are exiting to remain.

2.11 MASTER CONTROL UNIT

- A. Master Control Unit is exiting to remain.

2.12 INTRUSION SYSTEM CABLING

- A. Cables manufacturer shall be Belden, West Penn, Atlas, or engineer approved equal.
- B. Interior intrusion alarm cables conductors shall be color coded as follows:
 1. Two-conductor cables for motion detector power and interior sounder circuit: Gray jacket with red and black conductors.
 2. Two conductor cables for intrusion alarm expansion loop and POPIT sensor loop: Gray jacket with green and white conductors.
 3. Four-conductor cable for keypad data circuit: Gray jacket with red, black, green, and white conductors.

PART 3 - EXECUTION

3.01 MODIFICATIONS

- A. Prior to working on the modifications of the intrusion alarm system, the contractor shall verify the existing conditions of the system and identify any deficiencies to the OUSD Project Manager. The existing intrusion alarm system should be free and clear of troubles prior to the contractor starting work.
- B. If exterior terminal cabinets or pull boxes are to be re-used as part of the modifications, the contractor shall review the cable connections prior to starting work to ensure the connections are free of any corrosion and the enclosure has not been compromised with moisture. Any deficiencies shall be identified to the OUSD Project Manager.
- C. All batteries for modifications utilizing existing control units shall be replaced with new batteries as part of the modification.
- D. Any after-hours emergency B&G service calls resulting from the contractor's work shall be back-charged to the contractor.
- E. Any security false alarms caused by the contractor resulting in false alarm fees from Oakland Police Department shall be back-charged to the contractor.

3.02 WIRING AND RACEWAY CONFIGURATIONS

- A. The contractor shall follow the manufacturers' recommendation for cabling except as noted in this Standard. All POPEX data loops and wiring shall be installed utilizing twisted shielded pair cable. Proper installation and draining techniques must be followed (CEC Standards apply). Wire and cable sizes, number of conductors, shielding, or other data listed in this standard or if shown on drawings are a guide to the correct product required to achieve a working system and represent minimum acceptable equipment. Contractor is responsible for calculating and then installing proper wire gauge and type for manufacturer acceptable voltage drop/signal loss/distance limitations. The size of the school campus shall determine the wire gauge of the Zonex or POPIT cables for each project. Minimum gauge shall be 18 gauge. Maximum gauge shall be 12 gauge.
- B. All intrusion alarm cables shall be installed in conduit. No intrusion alarm cables shall be exposed. No intrusion alarm cables shall share a conduit with telephone, data, or intercom cables.
- C. All cable installed in underground or under slab conduits shall be listed for outdoor use. West Penn Aqua-Seal or equal shall be used for underground raceways. The underground raceway shall be verified in the field for use and access.
- D. When an underground wet usage rated cable enters into a building, it shall be continued un-spliced until it reaches the first device or panel.
- E. When new terminal cabinets or pull boxes are used on the exterior of the building, the enclosure shall be listed for weatherproof use, and water-resistant wire nuts shall be used for the cable connections. The enclosure shall be properly sealed with weatherproof gaskets to ensure no moisture shall enter into the enclosure and compromise the cable connections.
- F. There shall be no splicing of cables in underground boxes.
- G. A pull string shall be installed in all underground conduits.
- H. Cable colors and size shall be continuous throughout the building for each circuit.
- I. An additional 12 AWG THHN BLACK wire shall be installed from each remote power supply location directly back to the main panel to provide for a common reference point connection.

- J. All cables shall be labeled with the associated circuit number in all terminal cabinets, in the control unit, and in all remote power supplies.
- K. Splices shall be kept at a minimum and clearly labeled at j-boxes and/or terminal cabinets. Splices are not acceptable in underground or outside areas. Splices shall be made in terminal cabinets via terminal strips. All wire shall be identified on both ends, at splice locations and in all visible locations with a cable tag.
- L. No cables shall be terminated at the control unit until all cables have been tested for continuity in the presence of the Bosch technician and are free of any grounds, faults, or shorts. Once the integrity of the cables has been verified, the Bosch technician shall terminate all field wiring at the control unit and power supplies. Terminal cabinets shall be terminated by the contractor.

3.03 INTRUSION DEVICE LABELING

- A. All intrusion alarm devices shall be provided with device labels, which shall indicate the device's point assignment and shall be consistent with the information provided on the intrusion alarm drawings. These self-adhesive labels shall be machine manufactured with 1/2-inch high black text on white background.
- B. Existing devices/circuits that are to be reused need to be reviewed for updated addressing in the program and corresponding physical label on the devices.
- C. The IACP shall be programmed with point location descriptions to indicate the location of the initiating devices in the field. The location description shall indicate the building name, floor, room number, and associated point assignment and text.
- D. All batteries shall be labeled with the date of manufacture and date of installation.
- E. The point location description for the classroom numbers shall be coordinated with the Architectural room numbers for the project. All rooms shall be identified by a permanent room number above the door frame that shall designate the room number for the life of the building regardless of how it is identified by school staff during the years.
- F. Intrusion alarm terminal cabinets shall be labelled IATC.
- G. Intrusion alarm junction boxes shall be labelled IA.

3.04 TEST/FIELD QUALITY CONTROL

- A. Conduit rough-in shall be inspected by the IOR prior to pulling wire/cable. The IOR shall report to OUSD when this inspection is complete. OUSD B&G will confirm that the conduit rough-in is acceptable.
- B. Wire/cable installation shall be inspected by the IOR prior to installation of devices. The IOR shall report to OUSD when this inspection is complete. OUSD B&G shall confirm that the wire/cable installation is acceptable.
- C. The contractor shall maintain a set of working drawings during construction. The contractor's working drawings shall reflect all approved changes and deviations from the approved drawings. The IOR shall review the contractor's working drawings for compliance weekly during construction.
- D. Intrusion alarm devices installed in areas that have a potential to cause false alarms that are not obvious during plan review are to be re-located at the contractor's expense to areas where protection is provided, and false alarms resolved.
 - 1. Intrusion alarm devices shall be located a minimum of 5 feet away from wireless routers as possible.
- E. Special coordination shall be required with the OUSD's Alarm Shop regarding programming requirements prior to any programming of the existing control panels. The contractor shall meet with the OUSD's

representatives and submit proposed labels for all input and output points in writing for OUSD review and comment prior to any programming.

- F. Prior to any field programming via laptop with a direct connection to the Bosch 9412GV4 panel, the contractor is required to notify the B&G Alarm Shop at 510-535-2736 and provide notice to the OUSD Project Manager.
- G. Bosch's most current Remote Program Software (RPS) shall be used for programming. Prior to any request of a pre-test, the contractor shall submit the intrusion alarm program in Bosch RPS format to the alarm shop for review and approval.
- H. The contractor shall submit to B&G a completed programming sheet in printed format and in electronic format for preliminary review of proposed programming and descriptors. The contractor shall make any changes to the programming sheet and directed by the written review comments from B&G.
 - 1. When programming zones to indicated locations of alarms in the "Point Text," do not program the "Point Number" or abbreviations in the point field text.
- I. If there are more than one of the same type of location (i.e., Hall, Stairwell, Office, Storage, Janitor Closet, Rest Room, Counselor, Staff), the descriptor must indicate what area of which building. Programming with duplicate identical descriptor for different locations shall be rejected by OUSD and the contractor shall be required to revise programming. If any programming is found to be incorrect by the Alarm Shop, the contractor's project manager shall be notified via email. The contractor shall correct programming before continuing with project. All programming must be approved by the Alarm Shop before final testing of the alarm system can be scheduled.
- J. Programming for doors contacts, time zones, arming stations, motion sensors, tamper switches, etc. shall include text description locating initiating devices in the program with room numbers to be found on permanently mounted placards at room locations.

1. Example:

Point #	Label	Point Index	Point Index Description	Area
Point 143	Room B203	4	MD-Instant	3

- K. The contractor for any intrusion installation/modifications must receive a temporary alarm code for programming through the OUSD Project Manager before any programming is done. At no time shall the contractor extract alarm codes from the existing intrusion alarm system.
 - 1. If OUSD Alarm Shop personnel verify that the existing codes are compromised at the site, the contractor shall be liable for OUSD Alarm Shop's programming cost to correct the codes. An hourly rate of \$26.75 with a minimum 2 hours of OUSD's Alarm Shop's programming time shall be charged to the contractor.
 - 2. If Master District codes where all intrusion systems use the same Master District code are compromised, all intrusion system codes shall be deleted and reprogrammed by OUSD's Alarm Shop. A minimum of 60 hours at the aforementioned hourly rate will be charged to the contractor.
 - 3. It is a violation of security standards, as well as OUSD Standards to extract any secure or confidential information through security equipment unless OUSD's Alarm Shop has been contacted and has approved access for a specific reason.
 - 4. Any contractor that has access to OUSD's security information shall be licensed by the Board of Consumer Affairs.
 - 5. Should a violation occur, OUSD shall file a report and formal complaint of the contractor to the Board of Consumer Affairs of the violation in protocol.
- L. The control panel and the program shall be the property of OUSD and not the contractor. As such, no data lock or access codes shall be allowed with this system. Final payment shall not be made and the warranty period shall not begin until any such data lock or access codes (other than factory default codes) are removed.

- M. Programming software and programming files shall belong to OUSD. Turn over programming software and programming files shall be provided to OUSD prior to the end of project. Final payment shall not be made and the warranty period shall not begin until programming software and programming files have been received by OUSD.
- N. Any wiring problems or troubleshooting assistance shall be provided by a Bosch Certified vendor on a prevailing wage basis obtained by the contractor.
- O. OUSD B&G Alarm Shop Protocols
 - 1. OUSD Alarm Shop and its technicians' scope of work does not include assisting, advising, consulting, troubleshooting, or supporting any contractor hired for intrusion installations.
 - 2. OUSD reserves the right to check the progress and status of all installations at any time during the project with or without the permission of the superintendent at the site. They shall check-in with the contractor and may be accompanied with a contractor during their site visit.
 - 3. The scope of work including the panel type, the contractor's project manager's name and phone number, and panel's phone numbers shall be provided to B&G Alarm Shop in written format on the contractor's letterhead. Three original copies shall be required – one for B&G, one for the contractor, and one for the IOR. The contractor shall be responsible for ordering phone lines through B&G. An estimated test date shall be provided to OUSD Project Manager.
 - 4. The contractor shall provide the Alarm Shop's phone number to all subcontractors who may require the existing alarm systems be placed on test mode. The Alarm Shop's normal business hours phone number is 510-535-2736. If unable to reach the B&G Alarm Shop, call First Alarm at 800-882-5276.
 - 5. The contractor shall submit a request in writing to the IOR for a list of authorized security code holders. The IOR shall submit this request to OUSD. OUSD shall provide in writing the full names and titles of all persons who are to have authorized security codes.
 - 6. Security cards shall be provided by the Alarm Shop for the site Administrator and authorized staff. Security cards shall be picked up from B&G Alarm Shop by the OUSD project manager for distribution to the Administrator prior to going on line.

3.05 TESTING

- A. The OUSD project team shall be notified 72 hours prior to any and all acceptance testing of intrusion alarm systems. The OUSD project team shall also be notified to attend the testing on site or at the OUSD Alarm Shop receiving station.
- B. Prior to the pre-test with the OUSD team, the contractor shall perform a complete operational and functional test with the Bosch representative at least one week prior to scheduling a final acceptance test. Prior to the pre-test the intrusion alarm system shall be in a normal condition. The pre-test shall be for all intrusion alarm equipment and testing records of the pre-test shall be provided to ensure a successful final acceptance test. The scope of work as part of the project shall be 100 percent complete and shall be verified by the general contractor. If this requirement is not met and the test is terminated the cost to reschedule the inspection team shall be the responsibility of the general contractor. As part of the completion of work on the intrusion alarm systems, a fully-documented test of all the components of the intrusion alarm system shall be performed. A representative from the OUSD project team shall be present for the test on site. Any deficiencies reported by OUSD representatives and/or OUSD consultants shall be corrected and re-tested prior to calling for the final inspection.
- C. A report certifying that the installation is complete, pre-tested, and fully operational shall be developed and forwarded by the intrusion alarm technician to the OUSD Project Manager.
- D. The contractor, OUSD project team, the IOR, and an authorized Bosch representative shall be in attendance at the pre-test and final acceptance test to make any necessary adjustments. The test shall include, but not be limited to:
 - 1. Activation of all motion detectors and door contacts.
 - 2. Activation and visual check of every sounder.
 - 3. JENSEN HUGHES and/or B&G shall be present at the pre-test.

4. Alarm Shop and First Alarm shall participate in all intrusion system pre-tests to ensure signals are being received. B&G Alarm Shop shall confirm signals have been received.
 5. Once the pre-test is complete, the Alarm Shop shall provide the Project Manager a list of any alarm points that were not received at the Bosch panel. These alarms shall be re-activated and must be re-transmitted to both First Alarm and the OUSD receiving station prior to scheduling the final test.
 6. If the pre-test is successful, at the discretion of the IOR, the pre-test may be considered the final acceptance test.
- E. The contractor shall pay all overtime fees required by the IOR for witnessing the acceptance test.
 - F. Punch list items should be developed at the pre-test, and completed by the final acceptance test date, providing OUSD with a 100 percent functional and operating system, with no residual repair issues or requirements.
 - G. The Alarm Shop shall advise the contractor and IOR in writing (email is an acceptable method) once all data has been entered into the alarm system and receiving station. Only after receiving this notification shall the contractor request a time and date for final testing.
 - H. Final testing shall be performed by the contractor in the presence of the IOR. The OUSD Alarm Shop shall participate in the final test.
 - I. Provide property watch through the OUSD Custodial Services Department if the system is not operational at the final. If intrusion watch is required, then the OUSD Project Manager shall discuss the property watch requirement with B&G to make the necessary arrangement with OUSD personnel.
 - J. Testing shall not be conducted during school or custodial hours or any school functions. The building(s) must be completely unoccupied during any testing.
 - K. The contractor must provide a 100 percent test of all new devices.
 - L. 10 percent of devices that are not directly affected by the modification, up to a maximum of 50 devices, shall be tested to assure the IOR and the OUSD project team that the existing devices are functional. If any of the 10 percent devices fail, only the repaired devices need to be re-tested after they are repaired or replaced. The contractor shall be required to test 10 percent of the existing devices as part of their scope.
 - M. The contractor shall provide a count to the OUSD Alarm Shop for the quantity of new and existing intrusion alarm devices to be tested prior to testing.
 - N. If the intrusion alarm installation or modification is in "phased" stages or if there are substantial corrections and additions to the scope of the project, then the contractor shall assume responsibility for subsequent testing and retesting of the intrusion alarm system installation. After the last phase of the intrusion alarm system has been completed and tested totally, ten percent of the previously completed phases are to be tested with the final tested phase.
 - O. The contractor's project manager shall be responsible for contacting and coordinating with B&G personnel.
 - P. Provide an 8.5- by 11-inch site plan indicating the school name, school buildings (identified) and location of the GV4, power supplies, and keypads. This site plan shall be provided to OUSD Alarm Shop prior to testing.
 - Q. Provide complete Final Test Report of system along with Operation and Maintenance Manuals, as-built drawings, and warranty information. This information shall be provided before commencement of training.

3.06 TRAINING

- A. Any Bosch security system installations shall include training of site personnel. The training program for the Owner's personnel shall include the following:
 - 1. Operations and Maintenance Manuals including 11- by 17-inch as-built drawings. Operations and Maintenance Manuals shall be a binder, containing complete operating instructions, outlining step-by-step procedures required for system start up, operation, and shut down, including the manufacturer's name, model number, service manual, parts lists, and brief description of all equipment and their basic operation features. Complete maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, trouble-shooting guide, and as-built drawings of the complete system, including conduit layout, equipment layout, device labels, and simplified wiring and control diagrams of the system. Two Operations and Maintenance Manuals shall be submitted and approved prior to conducting the training course.
 - 2. Manuals containing listings of all points, event programs, basic programming and instructions, and software troubleshooting information.
 - 3. Two-hour training session for site and operating personnel. The session shall cover proper operating and response procedures, including training on false alarm prevention, system operations and fire keypad operation.
 - 4. Instructions provided by OUSD regarding other alarm system information such as identification label changes, code requests, service need information, Oakland Police Department's online test requirements, and the site's alarm permit number, account number, and current status are to be reviewed with the staff administrators and principals during the training session.

3.07 OUSD B&G PROJECT SIGN-OFF AND ACCEPTANCE

- A. Spare parts in accordance with this Standard shall be delivered to the Alarm Shop at the start of construction. A FINAL test shall not be scheduled until the spare parts have been received by B&G.
- B. No system troubles or equipment failures shall be present at the final acceptance testing. If there are troubles, the test shall not occur.
- C. OUSD B&G, as the End User/Owner of these systems, reserves the right to not accept any installation that does not adhere to these Standards. The contractor shall correct all issues to B&G's satisfaction before B&G will accept the system handover.
- D. No intrusion system shall be placed on line for site protection without user names for codes to arm/disarm the intrusion system been given to B&G Alarm Shop, the user information package delivered to the site administrator or principal, and training for site staff and personnel have been provided.
- E. The B&G Alarm Shop retains the right to disable an intrusion system until all requirements have been met.

3.08 WARRANTY

- A. The contractor shall warrant all materials, equipment, and workmanship to be free of defective materials, erroneous or missing programming, and faulty workmanship for one year from written notification of acceptance by Owner. The costs of such warranty shall be part of the project cost. If repairs are necessary during the warranty period, the contractor shall furnish all parts and labor to restore the system to normal operation at no cost to the Owner. The warranty period starts when the entire project is 100 percent completed and accepted in writing. During the warranty period, OUSD shall monitor the site and request service as required through the appropriate installer. One month prior to the expiration of the warranty period, the factory-trained service representative shall conduct a 100 percent test of the work performed. Any deficiencies found during that testing shall be corrected under the warranty agreement.
- B. The warranty shall include all necessary material, travel, labor and parts to replace defective components or materials, and all necessary factory and field software required to perform the specified tasks.

- C. The contractor shall commence repair of any “in warranty” defects within 24 hours of notification of such defects. Warranty service shall be performed by a Bosch-certified field service technician.
- D. The contractor shall provide, upon notification of a problem, a Bosch-certified field service technician to correct the problem within 24 hours of notification. The contractor shall provide loaner equipment if unable to repair faulty equipment within 48 hours of notification. The loaner equipment shall be operational within 48 hours of the original notification of a problem.
- E. Any component of the intrusion alarm system that becomes defective or non-operational during the one-year warranty period shall be repaired or replaced to the satisfaction of OUSD. If repairs are not made within the one-year warranty period, the defective or non-operational component shall be repaired at the contractor’s cost and shall not fall out of warranty.

3.09 AS-BUILT PROJECT RECORDS

- A. Before acceptance of work and final completion, the contractor shall provide project record “as-built” hard copy drawings and in AutoCAD format, reflecting any and all changes and deviations made to the fire alarm system during construction. The drawings shall indicate the following:
 - 1. As-built physical routing of wires to devices, including junction box locations.
 - 2. As-built riser diagram showing the zoning of devices and sounders.
 - 3. As-built panel wiring diagrams of the intrusion control panel(s) and power supplies.
 - 4. Floor plan with final room number showing each intrusion device, notification appliance, keypad and control point with their respective address identification number (i.e., an address of (MD1-24) for Device 24 on Expansion Board 1).
 - 5. All electrical circuit breaker panels and circuit numbers used for the IACP and remote power supplies.
 - 6. The original red-lined drawings that indicate true as-builts that have been updated throughout the duration of construction shall be submitted to the fire alarm vendor for their use in creating “as-built” drawings. These drawings shall be returned to the contractor if requested. Retention monies shall be withheld if the original as-built drawings are not provided.
 - 7. The acceptance testing records.
- B. Upon completion of the work, three sets of blackline record drawings shall be submitted to OUSD. Additionally, a CD-Rom with the intrusion alarm system as-builts in AutoCAD version 2011, full-size PDF drawing files, and a scanned copy of the final test forms signed by all parties shall be submitted as part of the close-out package.
- C. B&G Alarm Shop is to receive all equipment documentation, specifications, and data sheet information and manuals before project sign off.

END OF SECTION

SECTION 28 31 11

DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The contractor shall completely familiarize themselves with the "OUSD Fire Alarm System Standards" dated November 15, 2017. These standards shall be followed if there are discrepancies between the drawings and specifications.

1.02 SUMMARY

- A. Section Includes:
 - 1. System smoke detectors.
 - 2. Heat detectors.
 - 3. Beam Detectors
 - 4. Notification appliances.

1.03 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. NICET: National Institute for Certification in Engineering Technologies.
- D. PC: Personal computer.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.
 - 2. Include rated capacities, operating characteristics, and electrical characteristics.
- B. Shop Drawings: For fire-alarm system.
 - 1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - 2. Include plans, elevations, sections, details, and attachments to other work.
 - 3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
 - 4. Detail assembly and support requirements.
 - 5. Include voltage drop calculations for notification-appliance circuits.
 - 6. Include battery-size calculations.
 - 7. Include input/output matrix.
 - 8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
 - 9. Include performance parameters and installation details for each detector.

10. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
11. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

C. Product Samples: Contractor shall submit typical device installation for review by owner prior to purchase of products.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.06 SAMPLE WARRANTY: FOR SPECIAL WARRANTY.

1.07 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.
 - f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
 - g. Record copy of site-specific software.
 - h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Requirements and recommendations related to results of maintenance.
 - 5) Manufacturer's user training manuals.
 - i. Manufacturer's required maintenance related to system warranty requirements.
 - j. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: Provide on USB thumb drive.
3. Device address list.
4. Printout of software application and graphic screens.

C. Spare Parts

1. The contractor shall furnish the number of spare parts indicated in the OUSD Current Fire Alarm System Standards document prior to the final test being initiated.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level II technician.

1.09 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed and report to owner. Once contractor accepts system during construction they are responsible for restoring it to a normal operating condition.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary fire-watch service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.
- C. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and speak/strobe evacuation. The notification devices shall be initiated by a voice-evac control panel located in the existing 4100ES control panel. The transponder located in the IDF room shall contain a local amplifier for the speakers located in the gymnasium building.
- C. Automatic sensitivity control of certain smoke detectors.
- D. All components provided shall be listed for use with the selected system.
- E. 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.

2.02 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:

1. Heat detectors.
2. Smoke detectors.
3. Beam Detectors
4. Automatic sprinkler system water flow.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances, including voice evacuation notices.
2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Activate voice/alarm communication system.
6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
7. Close smoke dampers in air ducts of designated air-conditioning duct systems.
8. Record events in the system memory.
9. Record events by the system printer.
10. Indicate device in alarm on the graphic annunciator.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch for the fire sprinkler system.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.
10. Voice signal amplifier failure.

E. System Supervisory Signal Actions:

1. Identify specific device initiating the event at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
2. Record the event on system printer.
3. After a time delay of 200 seconds, transmit a supervisory signal to the remote alarm receiving station.

2.03 FIRE-ALARM CONTROL UNIT

A. Manufacturers: Existing system is a Simplex 4100- ES located in building C. This panel is Node 2 of the networked fire alarm system. The existing Simplex 4100U, also located in Building C, is Node 1.

B. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Pathway Class Designations: NFPA 72, Class B.
2. Pathway Survivability: Level 1.
3. Install no more than 100 addressable devices on each signaling-line circuit. Contractor shall install isolator modules for every fifty (50) devices installed on one SLC.

- C. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to the remote alarm station.
- D. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals,, supervisory and digital alarm communicator transmitters, shall be powered by 24-V dc source.
 - 1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- E. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 - 1. Batteries: Sealed lead calcium.
- F. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.04 SYSTEM SMOKE DETECTORS

- A. Manufacturers: Simplex
- B. General Requirements for System Smoke Detectors:
 - 1. Comply with UL 268; operating at 24-V dc, nominal.
 - 2. Detectors shall be of the two-wire type.
 - 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 - 4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
- C. Photoelectric Smoke Detectors:
 - 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

2.05 HEAT DETECTORS

- A. Manufacturers: Simplex
- B. General Requirements for Heat Detectors: Comply with UL 521.
 - 1. Temperature sensors shall test for and communicate the sensitivity range of the device.

- C. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.
 - 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.06 NOTIFICATION APPLIANCES

- A. Manufacturers: Simplex. Devices shall be strobes, speakers, and combination speaker/strobes as indicated on drawings with blank covers. Devices shall be fully compatible with the 4100ES Control and Transponder panels.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - 1. Connect new equipment to existing control panel in existing part of the building.
 - 2. Connect new equipment to existing monitoring equipment at the supervising station.
 - 3. Expand, modify, and supplement existing control equipment as necessary to extend existing control functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
 - 4. Contractor shall test 10% of existing initiation devices when work is completed to ensure that system is operational.
- C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.
- D. Smoke- or Heat-Detector Spacing:
 - 1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 - 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 - 3. Smooth ceiling spacing shall not exceed 30 feet.

4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A or Annex B in NFPA 72.
 5. HVAC: Locate detectors not closer than 36 inches from air-supply diffuser or return-air opening.
 6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- E. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
 - F. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install speakers on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated. See drawings 4-FA5.03 and 4-FA5.04 for additional information.
 - G. Visible Alarm-Indicating Devices: Install per requirements in 2016 NFPA 72. Details on drawing 4-FA5.03 are shown as an example of mounting requirements.
 - H. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.03 PATHWAYS

- A. Pathways above recessed ceilings and in non-accessible locations may be routed exposed.
 1. Exposed pathways located less than 96 inches above the floor shall be installed in EMT.
- B. Pathways shall be installed in EMT.
- C. Exposed EMT shall be painted to match adjacent building surfaces.
- D. Concealed EMT shall be painted red.

3.04 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 08 71 00 "Door Hardware." Connect hardware and devices to fire-alarm system.
 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 1. Smoke dampers in air ducts of designated HVAC duct systems.
 2. Supervisory connections at valve supervisory switches.

3.05 IDENTIFICATION

- A. All the new initiating devices shall be provided with device labels, which will indicate the device's address number (i.e., ID 2-129) and should be consistent with the addresses provided on the fire alarm drawings. These self-adhesive labels shall be machine manufactured with 1/2-inch high black text on white background. Labels on smoke or heat detectors shall be affixed to side of the base and the text shall be sized to be legible from floor level.
 1. Fire alarm devices installed in concealed locations (e.g., above-ceiling heat detectors) shall be labelled both on the device, and at a conspicuous location in the immediate vicinity of the concealed device (e.g., the ceiling grid below an above-ceiling heat detector).

- B. The FACU shall be provided with descriptions that indicate the location of the initiating device in the field. The descriptions shall indicate the building name, the floor, the room number, the type of device, and the address associated with the devices (example: Gym, Floor 2, Classroom G212, smoke detector ID 1-99).
- C. The descriptions for all areas, stairways and the classroom numbers shall be coordinated with the Architectural room numbers for the project. All rooms and areas shall be identified by a permanent room number above the door frame that shall designate the room number for the life of the building regardless of how it is identified by school staff during the years. All rooms without corridor/hall doors (accessed through other rooms) shall have the ID number of the corridor room and a letter designation as a separate space (200A and 200B) so the Oakland Fire Department will not be looking for room numbers not on the corridors.
- D. Conventional notification appliance labels shall correspond with the appliance's circuit number and position on the circuit (e.g., S3-8 for circuit no. 3, appliance no. 8) and should be consistent with the labels provided on the construction documents.
- E. Where the design uses addressable notification appliances, the labels shall correspond with the appliance's system point address (e.g., TAC2-1-4 for TrueAlert ES Addressable Controller No. 2, channel 1, appliance 4) and should be consistent with the addresses provided on the construction documents. Prior to programming the TrueAlert ES addressable notification appliance's system point address, the contractor shall verify the labels with SimplexGrinnell in the field. If the address has changed in comparison with the drawings, the label shall be corrected on the drawings to represent field conditions.
- F. All batteries shall be labeled with the date of manufacture and date of installation.
- G. The construction documents shall include a point list, which indicate the associated description for all of the initiating devices for the system. The list shall provide the point number, device type, and location description. The location description shall be in the format of building name, floor, and room number.
- H. Access door hatches shall be marked with screwed on engraved phenolic labels on the exterior and interior in 3/4-inch font height with the type of device (SD, HD, DD, etc.) and the address of the device(s).
- I. Fire alarm terminal cabinets shall be labelled FATC.
- J. Fire alarm junction boxes shall be labelled FA.

3.06 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.07 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.08 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.09 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION

SECTION 31 10 00 SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Comply with rules and regulations of State of California, California Code of Regulations, Title 8, Industrial Relations, Chapter 4, Subchapter 4, "Construction Safety Order."
- C. Comply with applicable local and state agencies having jurisdiction.
- D. Comply with governing EPA notification regulations.

1.02 SUMMARY

- A. Section Includes:
 - 1. Protecting existing vegetation to remain.
 - 2. Removing existing vegetation.
 - 3. Clearing and grubbing.
 - 4. Stripping and stockpiling topsoil.
 - 5. Stripping and stockpiling rock.
 - 6. Removing above- and below-grade site improvements.
 - 7. Disconnecting, capping or sealing, and removing site utilities.
 - 8. Temporary erosion and sedimentation control.
- B. Related Requirements:
 - 1. Section 015000 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.

1.03 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction as indicated on Drawings.
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.04 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.05 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Topsoil stripping and stockpiling program.
- C. Rock stockpiling program.
- D. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.06 QUALITY ASSURANCE

- A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.
- B. Rock Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.07 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 1. Do not proceed with work on adjoining property until directed by District Representative.
 - C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
 - D. Utility Locator Service: Notify Call Before You Dig (1.800.227.2600) before site clearing.
 - E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
 - F. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection," and as directed by the Project Arborist or District Representative.
 - G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.
- B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #23 (surface-tolerant, anticorrosive metal primer), or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- C. Protect existing site improvements to remain from damage during construction.
 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

~~3.03 TREE AND PLANT PROTECTION~~

3.04 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify District Representative not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without District Representative's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.

3.05 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction as approved by District Representative.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of eighteen inches below exposed subgrade.

3. Use only hand methods or air spade for grubbing within protection zones.
 4. Chip removed tree branches and stockpile in areas approved by District Representative.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
1. Place fill material in horizontal layers not exceeding a loose depth of eight inches, and compact each layer to a density equal to adjacent original ground.

3.06 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth in a manner to prevent intermingling with underlying subsoil or other waste materials.
1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects larger than two inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
1. Limit height of topsoil stockpiles to seventy-two inches.
 2. Do not stockpile topsoil within protection zones.
 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.

3.07 STOCKPILING ROCK

- A. Remove from construction area naturally formed rocks that measure more than one foot across in least dimension. Do not include excavated or crushed rock.
1. Separate or wash off non-rock materials from rocks, including soil, clay lumps, gravel, and other objects larger than two inches in diameter; trash, debris, weeds, roots, and other waste materials.
- B. Stockpile rock away from edge of excavations without intermixing with other materials. Cover to prevent windblown debris from accumulating among rocks.
1. Limit height of rock stockpiles to thirty-six inches.
 2. Do not stockpile rock within protection zones.
 3. Dispose of surplus rock. Surplus rock is that which exceeds quantity indicated to be stockpiled or reused.

3.08 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.09 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property in compliance with the District, City, County, and State regulations.
- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

Attachments

- None

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Comply with State of California Business and Transportation Agency, Department of Transportation (Caltrans) latest edition of "Standard Specifications." (CSS)
- C. Comply with State of California Code of Regulations (CCR).
- D. Comply with State of California Construction Safety Orders, Latest Edition (CAL/OSHA).

1.02 SUMMARY

A. Section Includes:

- 1. Excavating and filling for rough grading the Site.
- 2. Preparing subgrades for slabs-on-grade, walks, pavements, turfs and grasses
- 3. Excavating and backfilling for buildings and structures.
- 4. Drainage course for concrete slabs-on-grade.
- 5. Subbase course for concrete walks and pavements.
- 6. Subbase course and base course for asphalt paving.
- 7. Subsurface drainage backfill for walls and trenches.
- 8. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

- 1. ~~Section 013233 "Photographic Documentation" for recording pre-excavation and earth-moving progress.~~
- 2. ~~Section 033053 "Miscellaneous Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab on grade.~~
- 3. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
- 4. ~~Section 312319 "Dewatering" for lowering and disposing of ground water during construction.~~
- 5. ~~Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.~~

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6. ~~Section 329300 "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.~~

1.03 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength 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.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated in compliance with Section 19 of the Caltrans Standard Specifications.
 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by District Representative. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in work.
 2. Bulk Excavation: Excavation more than ten feet in width and more than thirty feet in length.
 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by District Representative. Unauthorized excavation, as well as remedial work directed by District Representative, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed one cubic yard for bulk excavation or three-quarters of a cubic yard for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
 1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.

2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.
- I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material three-quarters of a cubic yard or more in volume that exceed a standard penetration resistance of one hundred blows per two inches when tested by a geotechnical testing agency, according to ASTM D 1586.
- 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.

1.04 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct pre-excavation conference at the Project Site

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 1. Geotextiles.
 2. Controlled low-strength material, including design mixture.
 3. Geofoam.
 4. Warning tapes.
- B. Samples for Verification: For the following products, in sizes indicated below:
 1. Geotextile: twelve inches by twelve inches
 2. Warning Tape: twelve inches long; of each color.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 1. Classification according to ASTM D 2487.

2. Laboratory compaction curve according to ASTM D 1557.
- C. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.
- D. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.07 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 1. Do not proceed with work on adjoining property until directed by District Representative.
- C. Utility Locator Service: Notify Call Before You Dig (1.800.227.2600) for area where Project is located before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 311000 "Site Clearing" are in place.
- E. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.
- F. The following practices are prohibited within protection zones:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

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PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 or a combination of these groups; free of rock or gravel larger than two-and-a-half inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Construction of the subgrade shall also conform to Section 25-1.03, "Subgrade" of the Caltrans Standard Specifications.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 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. Construction of subbase shall also conform to Section 25, "Aggregate Subbases", of the Caltrans Standard Specifications and in conformance with the lines, grades and dimensions shown on the Drawings and typical cross-sections.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve. Construction of the base course shall also comply with Section 26, "Aggregate Bases", of the Caltrans Standard Specifications and in conformance with the lines, grades and dimensions shown on the Drawings and typical cross-sections.
- F. Engineered Fill: 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. Engineered fill shall also comply with the provisions of Section 19-3.06 of the Caltrans Standard Specifications.
- 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 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.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.02 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
 2. Apparent Opening Size: No. 70 (0.212-mm) sieve, maximum; ASTM D 4751.
 3. Permittivity: 0.1 per second, minimum; ASTM D 4491.
 4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.03 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Self-compacting, low-density, flowable concrete material produced from the following:
1. Portland Cement: ASTM C 150, Type II.
 2. Fly Ash: ASTM C 618, Class C or F.
 3. Normal-Weight Aggregate: ASTM C 33, three-quarters of an inch nominal maximum aggregate size. Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, and other extraneous material and shall be in accordance with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications.
 - a. Gradation shall be Combined Aggregate Grading in accordance with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications.
 4. Class 2 Aggregate Bases and Sub-bases shall be in accordance with Caltrans Standard Specifications Section 25 and 26.
- B. Produce low-density, controlled low-strength material with the following physical properties:
1. As-Cast Unit Weight: 30 to 36 pounds per cubic foot at point of placement, when tested according to ASTM C 138.
 2. Compressive Strength: 80 psi, when tested according to ASTM C 495.

2.04 GEOFOAM

- A. Extruded-Polystyrene Board Insulation: ASTM C 578.
- B. Molded-Polystyrene Board Insulation: ASTM C 578.
- C. Rigid Cellular Polystyrene Geofoam: ASTM D 6817.
- D. Connectors: Geofoam manufacturer's multibarbed, galvanized-steel sheet connectors

2.05 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 as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

- 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 as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, 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.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.02 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.03 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.04 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.
- B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by District Representative. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
 2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.

- b. 12 inches outside of concrete forms at footings.
- c. 6 inches outside of minimum required dimensions of concrete cast against grade.
- d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
- e. 6 inches beneath bottom of concrete slabs-on-grade.
- f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

3.05 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus one inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - 2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 - 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus one inch. Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
 - 1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.06 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.07 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations. Trench excavation and backfill shall conform to the provisions in the Caltrans Trenching and Shoring Manual and the Caltrans Standard Specifications.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

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- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
 - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
 - 3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.08 SUBGRADE INSPECTION

- A. Notify District Representative when excavations have reached required subgrade.
- B. If District Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons 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. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by District Representative, and replace with compacted backfill or fill as directed.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by District Representative, without additional compensation.

3.09 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by District Representative.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by District Representative.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 2. Surveying locations of underground utilities for Record Documents.
 3. Testing and inspecting underground utilities.
 4. Removing concrete formwork.
 5. Removing trash and debris.
 6. Removing temporary shoring, bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033053 "Miscellaneous Cast-in-Place Concrete."
- D. Trenches under Roadways: Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033053 "Miscellaneous Cast-in-Place Concrete."
- E. Backfill voids with satisfactory soil while removing shoring and bracing.
- F. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
 2. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the pipe or conduit. Coordinate backfilling with utilities testing.
- G. Final Backfill:
1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
 2. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.
- H. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 1. Under grass and planted areas, use satisfactory soil material.
 2. Under walks and pavements, use engineered fill.
 3. Under steps and ramps, use engineered fill.
 4. Under building slabs, use engineered fill.
 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 6 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent and to least 2 percent above optimum moisture content.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent and to least 2 percent above optimum moisture content.
 - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent and to least 2 percent above optimum moisture content.
 - 4. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent and to least 2 percent above optimum moisture content.

3.16 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.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- 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 one inch.
 - 2. Walks: Plus or minus one inch.
 - 3. Pavements: Plus or minus one-half inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of one-half inch when tested with a 10-foot straightedge.

3.17 SUBSURFACE DRAINAGE

- A. Subdrainage Pipe: Specified in Section 334600 "Subdrainage."

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- B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

3.18 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 - 1. Place base course material over subbase course under hot-mix asphalt pavement.
 - 2. Shape subbase course and base course to required crown elevations and cross-slope grades.
 - 3. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
 - 4. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - 5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.19 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 - 1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 - 2. Place drainage course 6 inches or less in compacted thickness in a single layer.
 - 3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - 4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.20 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections as required by the Owner.
- 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. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed as required by the District.
- 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.

3.21 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.
 - 1. Scarify or remove and replace soil material to depth as directed by District Representative; reshape and recompact.
- 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.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by District Representative.
 - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

Attachments

- None

END OF SECTION

SECTION 32 13 13 CONCRETE PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. California Code of Regulations (CCR): Title 24, Chapter 2-71, Site Development Requirements for ADA Accessibility.
- C. California Department of Transportation (Caltrans):
 - 1. Standard Specifications:
 - a. Section 26: Aggregate Bases.
 - b. Section 51: Concrete Structures.
 - c. Section 52: Reinforcement.
 - d. Section 73: Concrete Curbs and Sidewalks.
 - e. Section 90: Portland Cement Concrete.
- D. Traffic Manual.
- E. Highway Design.

1.02 SUMMARY

- A. Section Includes Concrete Paving Including the Following:
 - 1. Driveways.
 - 2. Parking lots.
 - 3. Curbs and gutters.
 - 4. Cast in place stairs and ramps.
 - 5. Walks.
- B. Related Requirements:
 - 1. Section 03 30 53 - MISCELLANEOUS CAST-IN-PLACE CONCRETE.
see INC#4 (DSA 01-116833)

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1.03 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.

1.04 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. Independent testing agency responsible for concrete design mixtures.
 - c. Concrete paving Subcontractor.
 - d. Manufacturer's representative of stamped concrete paving system used for stamped detectable warnings.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. 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.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
- B. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
 - 5. Curing compounds.

- 6. Applied finish materials.
 - 7. Bonding agent or epoxy adhesive.
 - 8. Joint fillers.
- C. Material Test Reports: For each of the following:
- 1. Aggregates
- D. Field quality-control reports.

1.07 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.
- 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- 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.

1.08 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

1.09 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 degrees Fahrenheit, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees Fahrenheit and not more than 80 degrees Fahrenheit at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- 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 degrees Fahrenheit 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. Using liquid nitrogen to cool concrete is Contractor's option.
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 and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.01 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless otherwise indicated.
- B. Concrete curbs, gutters, sidewalks, driveways and curb ramps shall be constructed of Minor Concrete per Caltrans Section 40, "Portland Cement Concrete Pavement"; Section 73, "Concrete Curbs and Sidewalks" and Section 90, "Portland Cement Concrete", of the Caltrans Standard Specifications, except as modified herein. Class 2 concrete have a minimum compressive strength of 3,000 pounds per square inch at 28 days and a 20-year pavement service life.

2.02 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.

2.03 STEEL REINFORCEMENT

- A. Welded Wire Mesh: Wire mesh shall be Grade 40 or Grade 60 6" x 6" x 10 gauge per ASTM A497 in accordance with Section 52 "Reinforcement," of the Caltrans Standard Specifications.
- B. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064, flat sheet.
- C. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884, Class A, plain steel.
- D. Reinforcing Bars: ASTM A 615, Grade 60; deformed.
- E. Galvanized Reinforcing Bars: ASTM A 767, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A 615, Grade 60 deformed bars.
- F. Epoxy-Coated Reinforcing Bars: ASTM A 775 or ASTM A 934; with ASTM A 615, Grade 60 deformed bars.

- G. Steel Bar Mats: ASTM A 184; with ASTM A 615, Grade 60 deformed bars; assembled with clips.
- H. Plain-Steel Wire: ASTM A 1064, galvanized.
- I. Deformed-Steel Wire: ASTM A 1064.
- J. Epoxy-Coated-Steel Wire: ASTM A 884, Class A; coated.
- K. Joint Dowel Bars: ASTM A615, Dowels shall be Grade 60 steel, #4 rebar or smooth coated dowels epoxied in place with slip covers twelve inches long.
- L. Epoxy-Coated, Joint Dowel Bars: ASTM A 775; with ASTM A 615, Grade 60 plain-steel bars.
- M. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- N. 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.
- O. 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:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
- P. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.
- Q. Zinc Repair Material: ASTM A 780.

2.04 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, Type II.
 - 2. Fly Ash: ASTM C 618, Class C or F.
 - 3. Slag Cement: ASTM C 989, Grade 100 or 120.
 - 4. Blended Hydraulic Cement: ASTM C 595.
- B. Normal-Weight Aggregates: Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, and other extraneous material and shall be in accordance with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications. 2. Gradation shall be Combined Aggregate Grading in accordance with Section 90 "Portland Cement Concrete," of

the Caltrans Standard Specifications. 3. Class 2 Aggregate Bases and Sub-bases shall be in accordance with Caltrans Standard Specifications Section 25 and 26

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Exposed Aggregate: Selected, hard, and durable; washed; free of materials with deleterious reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate as follows:
1. Aggregate Sizes: 3/4 to 1 inch nominal.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: 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.
1. Water-Reducing Admixture: ASTM C 494, Type A.
 2. Retarding Admixture: ASTM C 494, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.
- F. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
1. Color: As indicated by manufacturer's designation and as shown on Drawings.
- G. Water: Potable and complying with ASTM C 94.

2.05 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

- F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.06 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork in preformed strips.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
- E. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/4 inch.
- F. Pigmented Mineral Dry-Shake Hardener: Factory-packaged, dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
- G. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100 percent passing 3/8-inch sieve and 85 percent retained on a No. 8 sieve.

2.07 STAMPED DETECTABLE WARNING MATERIALS

- A. Detectable Warning Stamp: Semirigid polyurethane mats with formed underside capable of imprinting detectable warning pattern on plastic concrete; perforated with a vent hole at each dome.
- B. Liquid Release Agent: Manufacturer's standard, clear, evaporating formulation designed to facilitate release of stamp mats.
- C. Stair Treat Warning Strip:
 - 1. Provide anti-slip stair nosing style V24 as manufactured by Victory Treads, LLC, Pelham, AL 35124, 1-888-707-0005, or approved equivalent. Warning Strip shall provide 70% contrast with adjacent paving.
 - 2. Nosing to be type 6063 T5 extruded aluminum.
 - 3. Anti-slip abrasive shall include virgin grain aluminum oxide and/or silicon carbide. Abrasive shall be black. Abrasives to be locked in the extruded channels with a UV protected 2-part epoxy. Abrasive ribs shall extend above the extruded ribs a minimum of 1/16". Nosing shall not terminate more than 3" from the ends of the steps for poured concrete stairs.

2.08 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 and Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash or Pozzolan: 25 percent.
 - 2. Slag Cement: 50 percent.
 - 3. Combined Fly Ash or Pozzolan, and Slag Cement: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
- C. Add air-entraining admixture at manufacturer's prescribed rate.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- F. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate.
- G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.
- H. Concrete Mixtures: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 3000 psi or as indicated at 28 days.
 - 2. Maximum W/C Ratio at Point of Placement: 0.50
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.

2.09 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94 and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 and 90 degrees Fahrenheit reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees Fahrenheit reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 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 31 20 00 - EARTH MOVING.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.03 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.

3.04 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.
- E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.

- F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963.
- G. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.05 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. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
 - 5. 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 20 feet on center or as indicated on the Drawings.
 - 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:
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. Eliminate grooving-tool marks on concrete surfaces.
 - a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.
 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.
 - a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.
 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. Eliminate edging-tool marks on concrete surfaces.

3.06 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. 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.
- D. Comply with ACI 301, and with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. 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.

- G. 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, and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. 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.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.07 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.

3.08 SPECIAL FINISHES

- A. Monolithic Exposed-Aggregate Finish: Expose coarse aggregate in paving surface as follows:
 - 1. Immediately after float finishing, spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 - 2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.

3. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
 4. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.
- B. Seeded Exposed-Aggregate Finish: Immediately after initial floating, spread a single layer of aggregate uniformly on paving surface. Tamp aggregate into plastic concrete and float finish to entirely embed aggregate with mortar cover of 1/16 inch.
1. Spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove sheeting when ready to continue finishing operations.
 3. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
 4. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.
- C. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions and as follows:
1. Uniformly spread 40 lb/100 sq. ft. of dampened, slip-resistive aggregate over paving surface in two applications. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.
 2. Uniformly distribute approximately two-thirds of slip-resistive aggregate over paving surface with mechanical spreader, allow to absorb moisture, and embed by power floating. Follow power floating with a second slip-resistive aggregate application, uniformly distributing remainder of material at right angles to first application to ensure uniform coverage, and embed by power floating.
 3. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
 4. After curing, lightly work surface with a steel-wire brush or abrasive stone and water to expose nonslip aggregate.

3.09 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. per hour 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 moisture curing, moisture-retaining-cover curing, curing compound, or 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.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, 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.

3.10 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: 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 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for each 5000 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; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; 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; one test hourly when air temperature is 40 degrees Fahrenheit and below and when it is 80 degrees Fahrenheit and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39; 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.

3.12 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.

Attachments

- None

END OF SECTION

32 13 13 CONCRETE PAVING

SECTION 33 10 00 WATER SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This section describes general requirements, products, and methods of execution relating to on-site domestic water and fire water systems serving all buildings and appurtenances, unless otherwise superseded by the fire protection specification sections. Unless otherwise noted, this section does not apply to irrigation water systems and water systems inside and within 5 feet of buildings. Any work within the public right-of-way shall be constructed to the standards of the Oakland Unified School District, The State of California, The California Department of Transportation (CALTRANS), and the Division of the State Architect. This section applies to:
 - 1. On-site domestic water distribution and services.
 - 2. On-site fire water distribution and services.
- B. Contractor shall provide all labor, equipment, materials, and testing services unless otherwise noted.
- C. Related Sections:
 - 1. Section 31 20 00 Earth Moving

1.03 SUBMITTALS

- A. Comply with requirements of the Standard General Conditions and Agreement for Construction Services.
- B. Product Data: Manufacturer's literature and data, including, where applicable, sizes, pressure rating, rated capacity, listing/approval stamps, labels, or other marking on equipment made to the specified standards for materials, and settings of selected models, for the following:
 - 1. Piping and fittings.
 - 2. Gaskets, couplings, sleeves, and assembly bolts and nuts.
 - 3. Gate valves and ball valves.
 - 4. Blow-off valves, air release and vacuum valves, and combination air valves.
 - 5. Check valves.
 - 6. Pressure reducing valves.
 - 7. Backflow preventers.
 - 8. Valve boxes, frames and covers.
 - 9. Water meter boxes, frames and covers.
 - 10. Post indicators.
 - 11. Fire department connections and wet stand pipes.

12. Fire hydrants.
 13. Thrust block concrete mix and/or restrained joints and fittings.
 14. Tapping sleeves and tapping valves.
 15. Service saddles and corporation stops.
 16. Identification materials and devices.
 17. Corrosion protection.
- C. Shop Drawings and Calculations: Shop Drawings and Calculations shall be stamped and signed by a registered Fire Protection Engineer licensed by the State of California as required.
1. Include the following information:
 - a. Design assumptions.
 - b. Thrust block sizing and calculations.
 - c. Materials to be used.
 - d. Available water pressure.
 - e. Required water pressure.
 2. The review of fire system components constitutes only a portion of the review and approval required. A copy of the fire system component submittal package shall be forwarded to the local Fire Marshal for further review and approval.
- D. Test Reports:
1. Water Pressure Report: Contractor shall engage the public utility agency, or a qualified testing service to conduct a flow test of the existing water main(s). Provide date and location of test, type and method of test performed, static pressure and residual pressure in psig, observed flow in gpm, and orifice size.
 2. Bacteriologic Testing: Provide copies of the test results indicating water sample meets City and State Drinking Water Standards.
- E. Samples: None specified. Provide as necessary.

1.04 QUALITY ASSURANCE

- A. Comply with the latest edition of the following Standards and Regulations:
1. American Water Works Association (AWWA) and American National Standards Institute (ANSI):
 - a. C104/A21.4 ANSI Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 - b. C105/A21.5 ANSI Standard for Polyethylene Encasement for Ductile- Iron Pipe Systems.
 - c. C110/A21.10 ANSI Standard for Ductile-Iron and Gray-Iron Fittings, 3 inch - 48 inch for Water.
 - d. C111/A21.11 ANSI Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - e. C115/A21.15 ANSI Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.

- f. C116/A21.16 ANSI Standard for Protective Fusion-Bonded Epoxy Coatings Interior & Exterior Surfaces for Ductile-Iron and Gray-Iron Fittings.
 - g. C150/A21.50 ANSI Standard for Thickness Design of Ductile-Iron Pipe.
 - h. C151/A21.51 ANSI Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 - i. C153/A21.53 ANSI Standard for Ductile-Iron Compact Fittings for Water Service.
 - j. C500 Metal-Seated Gate Valves for Water Supply Service.
 - k. C502 Dry-Barrel Fire Hydrants.
 - l. C503 Wet-Barrel Fire Hydrants.
 - m. C504 Rubber-Seated Butterfly Valves.
 - n. C507 Ball Valves, 6 inches - 48 inches.
 - o. C508 Swing-Check Valves for Waterworks Service, 2 inches - 24 inches NPS.
 - p. C509 Resilient-Seated Gate Valves for Water Supply Service.
 - q. C510 Double Check Valve Backflow Prevention Assembly.
 - r. C511 Reduced-Pressure Principle Backflow Prevention Assembly.
 - s. C512 Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
 - t. C550 Protective Epoxy Interior Coating for valves and Hydrants.
 - u. C600 Installation of Ductile-Iron Water Mains and their Appurtenances.
 - v. C602 Cement- Mortar Lining of water Pipelines in place- 4 inches and larger.
 - w. C605 Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
 - x. C651 Disinfecting Water Mains
 - y. C652 Disinfection of Water-Storage Facilities
 - z. C800 Underground Service Line Valves and Fittings for 1/2 inches - 2 inches.
 - aa. C900 Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 inches - 12 inches, for Water Distribution.
 - bb. C901 Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inches through 3 inches, for Water Service.
 - cc. C905 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 inches - 48 inches.
 - dd. C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 inches - 63 inches, for Water Distribution and Transmission.
 - ee. C907 Polyvinyl Chloride (PVC) Pressure Fittings for Water, 4 inches - 8 inches.
 - ff. C908 PVC Self-Tapping Saddle Tees for Use on PVC Pipe.
 - gg. D103 Factory-Coated Bolted Steel Tanks for Water Storage.
2. National Fire Protection Association (NFPA):
- a. NFPA 13 Standard for the Installation of Sprinkler Systems.
 - b. NFPA 14 Standard for the Installation of Standpipe, Private Hydrants, and Hose Systems.

- c. NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection.
 - d. NFPA 22 Standard for Water Tanks for Private Fire Protection.
 - e. NFPA 24 Private Service Mains and their Appurtenances.
 - f. NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
3. Uni-Bell Plastic Pipe Association (UNI).
- a. PUB 3 PVC Pipe – Technology Serving the Water Industry.
 - b. PUB 7 External Corrosion of Underground Water Distribution Piping Systems.
 - c. PUB 8 Tapping Guide for AWWA C900 Pressure Pipe.
 - d. PUB 9 Installation Guide for PVC Pressure Pipe.
 - e. PUB 8 Recommended Practice for the Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe (Nominal Diameters 6-12 inch).
4. American Society of Testing and Materials (ASTM).
- a. ASTM A536 Standard Specification for Ductile Iron Castings.
 - b. ASTM A674 Standard Practice for Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids.
 - c. ASTM D1785 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - d. ASTM D2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe.
 - e. ASTM D2466 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 - f. ASTM D2564 Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
 - g. ASTM D2683 Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
 - h. ASTM D3139 Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - i. ASTM D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
 - j. ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
 - k. ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - l. ASTM F1055 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
 - m. ASTM F1056 Standard Specification for Socket Fusion Tools for Use in Socket Fusion Joining Polyethylene Pipe or Tubing and Fittings.
 - n. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

- o. ASTM A795 Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
 - p. ASTM A865 Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints.
 - q. ASTM B88 Standard Specification for Seamless Copper Water Tube.
5. American Society of Mechanical Engineers (ASME).
 - a. ASME B16 series for valves, fittings, flanges, and gaskets applicable for use in water systems.
 - b. ASME B1.20.1 American Standard Tapered Pipe Threads for factory-threaded pipe and pipe fittings.
 6. National Sanitation Foundation (NSF).
 - a. NSF/ANSI 14 Plastics Piping System Components and Related Materials.
 - b. NSF/ANSI 61 Standard for Drinking Water Systems Components - Health Effects.
 7. Underwriters Laboratories, Inc. (UL).
 - a. UL 157 Standard for Safety for Gaskets and Seals.
 - b. UL 194 Standard for Safety for Gasketed Joints for Ductile-Iron Pipe and Fittings for Fire Protection Service.
 - c. UL 213 Rubber Gasketed Fittings for Fire-Protection Service.
 - d. UL 246 Standard for Safety for Hydrants for Fire-Protection Service.
 - e. UL 262 Standard for Safety for Gate Valves for Fire-Protection Service.
 - f. UL 312 Standard for Safety for Check Valves for Fire-Protection Service.
 - g. UL 405 Standard for Safety for Fire Department Connections.
 - h. UL 448 Standard for Safety for Pumps for Fire-Protection Service.
 - i. UL 789 Standard for Safety for Indicator Posts for Fire-Protection Service.
 - j. UL 860 Pipe Unions for Flammable and Combustible Fluids and Fire- Protection Service.
 - k. UL 1091 Standard for Safety for Butterfly Valves for Fire-Protection Service.
 - l. UL 1285 Pipe and Couplings, Polyvinyl Chloride (PVC), for Underground Fire Service.
 - m. UL 1468 Direct Acting Pressure Reducing and Pressure Restricting Valves.
 - n. UL 1478 Standard for Safety for Fire Pump Relief Valves.
 8. FM Global (FM).
 - a. FM 1020 Automatic Water Control Valves.
 - b. FM 1045 Waterflow Detector Check Valves.
 - c. FM 1110 Indicator Posts.
 - d. FM 1111 Post-Indicator-Valve-Assembly.
 - e. FM 1112 Indicating Butterfly Valves.
 - f. FM 1120 and FM 1130 Fire Service Water Control Valves (OS&Y and NRS Type Gate Valves).

- g. FM 1210 Swing Check Valves.
 - h. FM 1221 Backflow Preventers (Reduced Pressure Principle and Double Check Valve Types).
 - i. FM 1311 Centrifugal Fire Pumps (Horizontal, Split-Case Type).
 - j. FM 1312 Centrifugal Fire Pumps (Vertical-Shaft, Turbine Type).
 - k. FM 1319 Centrifugal Fire Pumps (Horizontal, End Suction Type).
 - l. FM 1361 Water Pressure Relief Valve.
 - m. FM 1362 Pressure Reducing Valves.
 - n. FM 1371 Centrifugal Fire Pumps (In-Line Type).
 - o. FM 1510 Fire Hydrants (Dry Barrel Type) for Private Fire Service.
 - p. FM 1511 Fire Hydrants (Wet Barrel Type) for Private Fire Service.
 - q. FM 1530 Fire Department Connections.
 - r. FM 1610 Plastic Pipe & Fittings for Underground Fire Protection Service.
 - s. FM 1620 Pipe Joints & Anchor Fittings for Underground Fire Service Mains.
9. Plastics Pipe Institute (PPI).
 - a. Underground Installation of Polyethylene Pipe.
 - b. Polyethylene Joining Procedures.
 - c. Inspections, Test and Safety Considerations.
 10. American Association of State Highway and Transportation Officials (AASHTO) for H20 Loading.
 11. American Concrete Institute (ACI).
 - a. ACI 348 - Meter Pit Construction.
 12. California Department of Transportation (Caltrans): Standard Specifications:
 - a. Section 51: Concrete Structures.
 - b. Section 52: Reinforcement.
 - c. Section 55: Steel Structures.
 - d. Section 70: Miscellaneous Drainage Facilities.
 - e. Section 71: Existing Drainage Facilities.
 - f. Section 75: Miscellaneous Metal.
 - g. Section 90: Concrete.
 13. East Bay Municipal Utility District Standard Specifications and Details.
 14. City of Oakland Fire Prevention Regulations.
 15. Other authorities having jurisdiction.
- B. System Description: Grades and elevations are to be established with benchmarks referenced on Plans.
- C. Comply with East Bay Municipal Utility District and City of Oakland Standards and authorities having jurisdiction for the installation and testing of potable water piping and fire protection systems.

- D. All testing of systems specified in this section shall be witnessed by representatives of the local water department or local authority. Provide at least 7 days' notice.
- E. The Contractor shall prepare shop drawings and calculations, and obtain all required approvals for the fire water system of the proposed project. Contractor shall have shop drawings and calculations stamped and signed by a fire protection engineer, licensed by the State of California, as required by the City of Oakland.

PART 2 - PRODUCTS

2.01 PIPING

- A. Water Distribution Main (pipe size 4 inches and larger).
 - 1. Ductile Iron Pipe (DIP): Pressure Class 350 pipe conforming to AWWA/ANSI C151/A21.5, cement-mortar lining conforming to AWWA/ANSI C104/A21.4, with standard thickness per AWWA/ANSI C150/A21.50. U.S. Pipe, American Cast Iron Pipe Company (ACIPCO), or approved equivalent.
 - a. Flanged ends shall conform to AWWA/ANSI C115/A21.15.
 - b. Rubber-gasket joints shall conform to AWWA/ANSI C111/A21.11.
 - 2. Polyvinyl Chloride Pipe (PVC): Pressure Class 305, DR 14, spigot and gasket bell end, conforming to AWWA C900 or AWWA C905, with equivalent cast-iron pipe outer diameter (O.D.). J-M Manufacturing, PW Pipe, North American Pipe Company, or approved equivalent.
 - 3. Polyethylene Pipe (PE): PE 3408, Pressure Class 160, DR 11, conforming to AWWA C906. Driscopipe 4000/4100, or approved equivalent.
- B. Water Service Line (pipe size 3 inches and smaller)
 - 1. Copper (Cu): Provide Type K soft or hard copper pipe conforming to ASTM B88.
 - 2. High Density Polyethylene Pipe (HDPE): PE3408, Pressure Class 200, DR 9 conforming to AWWA C901. PW PIPE or approved equivalent.

2.02 FITTINGS, GASKETS, COUPLINGS, SLEEVES, AND ASSEMBLY BOLTS AND NUTS

- A. For DIP: Provide fittings with pressure rating greater than or equal to that of the pipe. Provide flanged joints, mechanical joints, push-on joints, and insulating joints where indicated. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends. Provide mechanically coupled type joints using a sleeve-type mechanical coupling where indicated. Provide ends of pipe and fittings suitable for the specified joints. Fittings shall have cement-mortar lining conforming to AWWA/ANSI C104/A21.4.
 - 1. Flanged Joints: Provide bolts, nuts, and gaskets in conformance with AWWA/ANSI C115/A21.15. Flanged fittings shall conform to AWWA/ANSI C110/A21.10 or C153/A21.53.
 - a. Provide flange for set screwed flanges of ductile iron, ASTM A536, Grade 65-45-12, and conform to the applicable requirements of ASME B16.1, Class 250.
 - b. Provide setscrews for set screwed flanges of 190,000 psi tensile strength, heat treated and zinc-coated steel.
 - c. Gaskets for set screwed flanges shall conform to the applicable requirements for mechanical-joint gaskets specified in AWWA/ANSI C111/A21.11.

- d. Design of set screwed gaskets shall provide for confinement and compression of gasket when joint to adjoining flange is made.
 - e. Unless otherwise required, above ground flange assembly bolts shall be standard hex-head, cadmium plated machine bolts with American Standard Heavy, hot-pressed, cadmium plated hexagonal nuts. Buried flange nuts and bolts shall be as above except they shall be of Type 304 stainless steel.
- 2. Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets shall conform to AWWA/ANSI C111/A21.11.
 - 3. Push-on Joints: Provide shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly conforming to AWWA/ANSI C111/A21.11. Modify bell design fittings, as approved.
 - 4. Insulating Joints: Provide a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact at the joint between adjacent sections of dissimilar metals.
 - a. Provide joint of the flanged type with insulating gasket, insulating bolt sleeves, and insulating washers.
 - b. Provide gasket of the dielectric type, full face, as recommended in AWWA/ANSI C115/A21.15.
 - c. Provide bolts and nuts as recommended in AWWA/ANSI C115/A21.15.
 - d. Fittings shall be epoxy lined and coated with a thickness not less than 6-mils.
- B. For PVC: Fittings shall be DIP or PVC.
- 1. DIP fittings: Provide gray-iron or ductile-iron conforming to AWWA/ANSI C110/A21.10, with cement-mortar lining conforming to AWWA/ANSI C104/A21.4, and standard thickness, with equivalent cast-iron pipe O.D.
 - a. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except the bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe.
 - b. Provide push-on joints, compression joints and mechanical joints where indicated between pipe and fittings, valves, and other accessories.
 - c. Mechanical joints, glands, bolts and nuts, and gaskets shall conform to AWWA/ANSI C111/A21.11.
 - d. Fittings shall be epoxy lined and coated with a thickness not less than 6-mils.
 - 2. PVC fittings: Provide fabricated PVC fittings for pressure pipe conforming to AWWA C900, C905, or C907.
 - a. PVC fittings shall conform to ASTM D2466.
 - b. Push-on joints shall conform to ASTM D3139.
 - c. Compression joints shall conform to ASTM D3139.
 - d. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets shall conform to ASTM F477.
- C. For PE: Fittings shall conform to AWWA C901 or AWWA C906. Driscopipe, or approved equivalent.
- 1. Socket type fittings shall conform to ASTM D2683.

2. Butt fusion fittings shall conform to ASTM D3261.
 3. Electrofusion fittings shall comply with ASTM F1055.
- D. For Cu:
1. Cast copper alloy solder-joint pressure fittings shall conform to ASME B16.18.
 2. Wrought copper solder-joint pressure fittings or wrought copper alloy unions shall conform to ASME B16.22
 3. Cast copper alloy flare fittings shall conform to ASME B16.26.
 4. Wrought copper alloy body, hexagonal stock, metal-to-metal seating surfaces, and solder-joint threaded ends shall conform to ASME B1.20.1.
 5. Compression connections shall be Mueller 110, Ford or approved equivalent.
- E. For HDPE:
1. Cast Copper Fittings shall conform to ASME B16.18.
 2. Cast Copper Compression Fittings and connections shall be Mueller 110 Ford or approved equivalent.

2.03 GATE VALVES AND BALL VALVES

- A. Gate Valves: Valves shall open by counterclockwise rotation of the valve stem. Provide valves with ends as appropriate for the adjoining pipe.
1. Stuffing boxes shall have O-ring stem seals. Provide stuffing boxes bolted and constructed so as to permit easy removal of parts for repair.
 2. Valves:
 - a. Provide valves manufactured in accordance with AWWA C-504-87, Class 150B, short body valve conforming to AWWA C500 or AWWA C509 and of one manufacturer. Valves shall have a non-rising stem, a 2-inch square nut, and double-disc gates. Valves shall be rated for 250 psi maximum working pressure. Valves < 3 inches shall be American Darling and Manufacturing Co. No. 52 or Ludlow-Renssel Architect and Engineer Valve Division Model No HD-132, List 134. Valves 3-inches or larger shall be Walworth Fig 726F or Crane Fig No. 465-1/2.
 - b. For the domestic water system, valves shall also conform to ANSI/NSF 61.
 - c. For the fire water system, valves 2 inches through 16 inches in size shall also conform to UL 262 and FM 1120 or FM 1130 to a working pressure of 200 psi.
 3. Where a post indicator is shown, provide valve with an indicator post flange.
- B. Ball Valves: Valves shall open by counterclockwise rotation of the valve stem. Provide valves with ends as appropriate for the adjoining pipe.
1. Valves (2-inches and smaller):
 - a. Provide valves conforming to AWWA C800 and of one manufacturer and shall be Crane Co. Accesso Cat No. 2330-TF or Lunkenheimer Fig. No. 700SB.
 2. Provide valve with operating nut or handle as shown on the Construction Documents.

2.04 BLOW-OFF VALVES, AIR RELEASE AND VACUUM VALVES, AND COMBINATION AIR VALVES

- A. Blow-off valves: Provide valve and service size as shown in the Contract Documents. Provide 2-inch valves at low points of the piping system, and 4-inch valves at dead-ends of the piping system, unless otherwise directed by the Engineer.
 - 1. 2-inch blow-off shall have a 2-inch vertical female iron pipe (FIP) inlet and a 2-inch normal pressure and temperature (NPT) nozzle outlet with cap. Valve shall open by counterclockwise rotation of a top-mounted 9/16-inch square operating nut. All working parts shall be serviceable without excavation. Kupferle/Truflo Model TF550, or approved equivalent.
 - 2. 4-inch blow-off shall have a 4-inch vertical FIP inlet and a 4-inch male iron pipe (MIP) outlet with cap. Valve shall open by counterclockwise rotation of a top-mounted 9/16-inch square operating nut. All working parts shall be serviceable without excavation. Kupferle/Truflo Model TF800, or approved equivalent.
- B. Air release and vacuum valves: Provide valve and service size as shown on the Contract Documents, and where there is an increase in the downward slope or a decrease in the upward slope of the piping system. Valve shall have cast-iron single valve body, and shall conform to AWWA C512. A compound lever system shall have a maximum operating pressure of 300psi. Provide a protective cap for the outlet of the valve. Provide universal air-vacuum type valves, Crispin Model UL, Apco, or approved equivalent.
- C. Combination air valves: Provide valve and service size as shown on the Contract Documents, and at high points and sharp changes in gradient of the pipe system. Valve shall have cast-iron single valve or double valve body, and shall conform to AWWA C512. A simple or compound lever system shall have a maximum operating pressure of 300psi. Provide a protective cap for the outlet of the valve. Crispin Model C, Apco, or approved equivalent.

2.05 CHECK VALVES

- A. Valves: Valves shall have clear port opening and a cast-iron body. Provide spring-loaded or weight-loaded valves where indicated on the Construction Documents.
 - 1. For the domestic water system, provide swing-check type valves conforming to AWWA C508. Provide valves of one manufacturer. Mueller, Apco, or approved equivalent.
 - 2. For the fire water system, provide swing-check type valves conforming to FM 1210 and UL 312. Mueller, Watts, or approved equivalent.

2.06 PRESSURE REDUCING VALVES

- A. Pressure Reducing Valves: Valves shall have a cast-iron body, conforming to ASTM A536, with epoxy interior coating conforming to AWWA, and rated to Pressure Class 300 and be C.M. Bailey Co. or Fisher, or approved equivalent.
 - 1. Valves shall have flanged ends.
 - 2. Valves sized 3-inches or smaller may have screwed ends.

2.07 POST INDICATORS

- A. Posts Indicators shall withstand up to 900 ft-lbs of operating torque, be free-standing, and tamper-proof.

- B. Post Indicators shall conform to UL 789 and FM 1110. Mueller, ACIPCO, or approved equivalent.

2.08 VALVE BOXES, METER BOXES, FRAMES AND COVERS

- A. Water Valve Box: Provide pre-cast concrete valve box for each buried valve. Provide box with steel or cast iron traffic cover marked "WATER." Christy Model G5 with G5C covers or approved equivalent.
- B. Valve or Meter Boxes: Contractor shall verify box size required for water system appurtenances as shown in the Contract Documents. Provide a precast concrete utility box for each buried appurtenance. Provide a traffic-rated lid for H2O loading. A non-traffic rated lid may be used for boxes located in landscape areas. Christy, or approved equivalent.

2.09 BACKFLOW PREVENTERS

- A. Provide backflow preventers as shown on the Contract Documents. Subject to local water department approval. Backflow preventers on the fire water system shall be subject to approval by the local office of the Fire Marshal.
- B. Reduced Pressure Principle Assemblies (RPPA): Provide a cast-iron body RPPA consisting of two independently operating check valves with a pressure differential relief valve located between the two check valves, two shut-off valves and four test cocks. RPPA shall be tamper-proof and conform to AWWA C511. Per the EBMUD approved list, Febco, Wilkins, Watts, Ames or approved equivalent.
- C. Double Check Detector Assemblies (DCDA): Provide a cast-iron body DCDA consisting of mainline double check assemblies in parallel with a bypass double check and meter assembly, two shut-off valves and four test cocks. DCDA shall be tamper-proof and conform to AWWA C510. Per the EBMUD approved list, Febco, Wilkins, Watts, Ames or approved equivalent.

2.10 FIRE DEPARTMENT CONNECTIONS AND WET STAND PIPES

- A. Fire Department Connections (FDC): Provide FDC's with 2-1/2 inch female hose connections, sidewalk or free-standing type. Number of inlets shall be as shown on the Contract Documents. Clapper and spring check inlets shall each have a minimum capacity of 250 gpm, and be furnished with knox FDC plug. Outlet shall be sized for simultaneous use of all inlets. Connection shall be branded "AUTO SPKR".
 - 1. 2-Way FDC: Connection shall conform to UL 405 or FM 1530. Elkhart, Croker, or approved equivalent.
 - 2. 3-Way FDC: Connection shall be subject to approval by the local water department or Fire Marshal. Elkhart, Croker, Potter-Roemer or approved equivalent.
 - 3. 4-Way FDC: Connection shall conform to UL 405. Potter-Roemer, Croker, or approved equivalent.
 - 4. 6-Way FDC: Connection shall be subject to approval by the local water department or Fire Marshal. Croker, Potter-Roemer or approved equivalent.
- B. Wet Stand Pipes (WSP): Provide 2-Way WSP's with valves and two (2) 2-1/2 inch male hose connections free-standing type, with a 4" inlet. Each outlet shall each have a minimum capacity of 250 gpm, and be furnished with a cap and chain. Water to the WSP shall be controlled with a remote valve. Connection shall be branded "HYDRANT." Subject to approval by the local water department or Fire Marshal. Croker, Elkhart, Potter-Roemer or approved equivalent.

2.11 FIRE HYDRANTS

- A. Provide two 2-1/2 inch and one 4-1/2 inch outlets with a 6-inch nominal inside diameter inlet and break-away type bolts. Hydrant shall have a working pressure of 250 psi and shall conform to AWWA C502 or C503, and be UL listed and FM approved. Provide hydrants of one manufacturer. Per the EBMUD approved list, Clow 800 series, Mueller, ACIPCO, or approved equivalent, subject to approval by the local water department and Fire Marshal. Paint private hydrants yellow.

2.12 THRUST BLOCKS AND PIPE RESTRAINTS

- A. Blocks: Provide thrust blocks in accordance with NFPA 24 Standards. Use concrete conforming to ASTM C94 having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2-1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.
- B. Pipe Restraints: Provide thrust restraint systems for fittings and joints as required or as indicated on the Plans.
 - 1. For mechanical joint fittings and joints: Pipe restraints shall be "Mega-Lug" pipe restraint system by EBBA Iron, Inc., or approved equivalent.
 - 2. or push-on joint fittings and joints: Pipe restraints shall be "Field-Lok" gaskets by U.S. Pipe, or approved equivalent.
- C. Thrust blocks, gravity blocks, or mechanical pipe restraints may be used at Contractor's option, unless otherwise indicated on the Plans.
- D. Provide thrust blocks or mechanical pipe restraints at all fittings and changes in angle, alignment or elevation.
- E. Where depth or location of water piping, existing utilities, or other structures prohibit the use of standard thrust blocks, gravity blocks or mechanical pipe restraints may be used. Conform to NFPA 24 Standards.

2.13 TAPPING SLEEVES AND TAPPING VALVES

- A. Sleeves shall be epoxy coated and furnished with stainless steel washers, nuts and bolts. Mueller H-615 and H-619, Ford, or approved equivalent.
- B. Tapping valves shall have flanged inlet, Class 125, conforming to ASME B16.1 and furnished with stainless steel washers, nuts and bolts. Tapping valves shall be constructed with a mechanical joint outlet. Mueller T-687, T-642, T-681, or approved equivalent.

2.14 SERVICE SADDLES AND CORPORATION STOPS

- A. Service Saddles: Saddles shall conform to AWWA C800 and NSF 61.
 - 1. For DIP: Provide bronze or stainless steel body, double strap type with a 200 psi maximum working pressure. Mueller BR2 Series, Ford, or approved equivalent.
 - 2. For PVC: Provide bronze body, wide strap type. Mueller H-13000 Series, Ford, or approved equivalent.
- B. Corporation Stops: Provide ground key type; bronze conforming to ASTM B61 or ASTM B62, for a working pressure of 100 psi. and suitable for the working pressure of the system.

1. Ends shall be suitable for adjoining pipe and connections, solder-joint, or flared tube compression type joint.
2. Threaded ends shall conform to AWWA C800.
3. Coupling nut for connection to flared copper tubing shall conform to ASME B16.26.
4. Mueller H-15000 Series with "CC" threads and a copper flare straight connection outlet, Ford, or approved equivalent.

2.15 IDENTIFICATION MATERIALS AND DEVICES

- A. Marker Tape: Provide marker tape consisting of metallic foil bonded to plastic film not less than 2-inches wide. Film shall be inert polyethylene plastic. Film and foil shall each not be less than 1-mil. thick. The tape shall be identified with lettering, not less than 3/4-inch high, "CAUTION: WATER MAIN BELOW," repeated at approximately 24-inch intervals.
- B. Tracer Wire for Nonmetallic Piping: Provide 12 gage, coated copper or aluminum wire not less than 0.10 inch in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe. Wire shall be tied in at all valves.

2.16 CORROSION PROTECTION

- A. In soils with high resistivity, high sulfides, high/low ph, redox potential and/or poor surrounding drainage conditions, or as indicated in the Contract Documents, encase underground pipe and appurtenances in 4-mil, high-density cross- laminated (HDCL) polyethylene film or 8-mil linear low-density (LLD) polyethylene film in accordance with AWWA/ANSI C105/A21.5. U.S. Pipe, ACIPCO, or approved equivalent.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where water service is being installed.
- B. Do not begin installation until unsatisfactory conditions have been corrected.

3.02 LOCATION OF WATER LINES

- A. Where the location of the water line is not clearly defined by dimensions on the Plans, do not lay water line closer than 10 feet horizontally from any sewer line.
- B. Where water lines cross under gravity sewer lines, encase sewer line in concrete for a distance of at least 10 feet on each side of the crossing, unless sewer line is made of pressure pipe with rubber-gasketed joints and no joint is located within 3 feet horizontally of the crossing.
- C. Where water lines cross sewer force mains and inverted siphons, install water line at least 2 feet above these sewer lines.
- D. When joints in the sewer line are closer than 3 feet horizontally from the water line, encase sewer line joints in concrete.
- E. Do not lay water lines in the same trench with other utilities.
- F. Install water lines at 3'-0" minimum depth or as detailed on Construction Documents or municipal details.

3.03 INSTALLATION OF PIPING

- A. Inspection:
 - 1. Before placing in position, inspect pipe for noticeable defects. Clean the pipe, fittings, valves, and accessories, and maintain in a clean condition.
 - 2. Remove fins and burrs from pipe and fittings.
- B. Pipe laying and jointing:
 - 1. Provide proper facilities for lowering sections of pipe into trenches.
 - 2. Do not drop or dump pipe, fittings, valves, or any other water line material into trenches.
 - 3. Cut pipe accurately to length established at the site and work into place without springing or forcing. Replace any pipe or fitting that does not allow sufficient space for proper installation of jointing material.
 - 4. Blocking or wedging between bells and spigots will not be permitted. Lay bell- and-spigot pipe with the bell end pointing in the direction of lying.
 - 5. Grade the pipeline in straight lines; avoid the formation of dips and low points.
 - 6. Support pipe at proper elevation and grade.
 - 7. Provide secure firm, uniform support. Wood support blocking will not be permitted.
 - 8. Lay pipe so that the full length of each section of pipe and each fitting rests solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings.
 - 9. Provide anchors and supports where indicated and where necessary for fastening work into place.
 - 10. Make proper provision for expansion and contraction of pipelines.
 - 11. Keep trenches free of water until joints have been properly made.
 - 12. Do not lay pipe when conditions of trench or weather prevent proper installation.
 - 13. All fittings shall be blocked with appropriately sized thrust blocks as shown in the Contract Documents.
- C. Installation of Tracer Wire:
 - 1. Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe.
 - 2. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.
- D. Connections to Existing Lines:
 - 1. Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line.
 - 2. Make connections to existing lines under pressure in accordance with the recommended procedures of a manufacturer of pipe of which the line being tapped is made.
- E. The end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads to keep out debris and contamination.

3.04 INSTALLATION OF DUCTILE-IRON PIPING

- A. Install pipe and fittings in accordance with requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

- B. Jointing:
1. Provide push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly.
 2. Provide mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and with the recommendations of AWWA C111.
 3. Provide flanged joints with the gaskets, bolts, and nuts specified for this type joint.
 - a. Install flanged joints up tight; avoid undue strain on flanges, fittings, valves, and other equipment and accessories.
 - b. Align bolt holes for each flanged joint.
 - c. Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted.
 - d. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without over straining the flange.
 - e. Where flanged pipe and fitting have dimensions that do not allow the installation of a proper flanged joint as specified, replace it by one of proper dimensions.
 - f. Use set screwed flanges to make flanged joints where conditions prevent the use of full-length flanged pipe. Assemble in accordance with the recommendations of the set screwed flange manufacturer.
 4. Provide insulating joints with the gaskets, sleeves, washers, bolts, and nuts previously specified for this type joint. Assemble insulating joints as specified for flanged joints. Bolts for insulating sleeves shall be full size for the bolt holes.
 5. Ensure that there is no metal-to-metal contact between dissimilar metals after the joint has been assembled.
- C. Exterior Protection: Completely encase buried ductile iron pipelines and underground appurtenances with polyethylene wrap. Install 8-mil linear low-density polyethylene (LLD) film or 4-mil high-density cross-laminated (HDCL) film per manufacturer's recommendations and in accordance with AWWA/ANSI C105/A21.5 and ASTM A674.
- D. Pipe Anchorage:
1. Provide concrete thrust blocks or restrained joints for pipe anchorage, except where metal harness is indicated on the Construction Documents.
 2. Pipe anchorage shall be in accordance with NFPA 24 Standards.

3.05 INSTALLATION OF POLYVINYL CHLORIDE PIPING

- A. Install pipe and fittings in accordance with the requirements of UNI B-3 for the following:
1. The laying of pipe, joining PVC pipe to fittings and accessories.
 2. The setting of hydrants, valves, and fittings.
- B. Comply with the recommendations for pipe joint assembly and appurtenance installation in AWWA Manual M23, Chapter 7, "Installation."
- C. Comply with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111.

D. Jointing:

1. Provide push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings.
2. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel.
3. For push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint.
4. Use an approved lubricant recommended by the pipe manufacturer for push-on joints.
5. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the requirements of UNI B-3 for joining PVC pipe to fittings and accessories and with the applicable requirements of AWWA C600 for joint assembly.
6. Make compression-type joints/mechanical-joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint. Cut off spigot end of pipe for compression-type joint or mechanical-joint connections and do not re-bevel.
7. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.

E. Pipe Anchorage:

1. Provide concrete thrust blocks or restrained joints for pipe anchorage, except where metal harness is indicated on the Construction Documents.
2. Anchorage shall be in accordance with the requirements of UNI B-3 and in accordance with NFPA 24 Standards for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated on the Construction Documents.

3.06 INSTALLATION OF POLYETHYLENE PIPING

A. Install pipe, fittings, and appurtenances in accordance with PPI and Manufacturer's Recommendations.

B. Jointing:

1. Provide mechanical joints, compression fittings, or flanges as recommended by the manufacturer.
2. Jointing shall be performed using proper equipment and machinery by trained and certified personnel.
3. Joints, fittings and tools shall be clean and free of burrs, oil, and dirt.
4. Butt fusion:
 - a. Pipe ends shall be faced to establish clean, parallel mating surfaces.
 - b. Align and securely fasten the components to be joined squarely between the jaws of the joining machine.
 - c. Heat the ends of the pipe to the pipe manufacturer's recommended temperature interface pressure and time duration. A pyrometer or other surface temperature measuring device should be used to insure proper temperature of the heating tool. Temperature indicating crayons shall not be used on a surface which will come into contact with the pipe or fitting.

- d. Prevent molten plastic from sticking to the heater faces. Molten plastic on the heater faces shall be removed immediately according to the tool manufacturer's instructions.
 - e. Bring the molten ends together with sufficient pressure to properly mix the pipe materials and form a homogeneous joint. Hold the molten joint under pressure until cooled adequately to develop strength. Refer to the Manufacturer's Recommendations for temperature, pressure, holding, and cooling times.
 - f. Remove the inside bead from the fusion process using Manufacturer's recommended procedure.
5. Socket fusion:
- a. Mixing manufacturers' heating tools and depth gages will not be allowed unless the tools conform to ASTM F1056.
 - b. Pipe ends shall be faced square to establish clean, parallel mating surfaces.
 - c. Clamp the cold ring on the pipe at the proper position using a depth gauge.
 - d. Heat the tool to the pipe manufacturer's recommended temperature. A pyrometer or other surface temperature measuring device should be used to insure proper temperature. Temperature indicating crayons shall not be used on a surface which will come into contact with the pipe or fitting.
 - e. Follow manufacturer's recommendations for bringing the hot tool faces into contact with the outside surface of the end of the pipe and the inside surface of the socket fitting.
 - f. Simultaneously remove the pipe and fitting from the tool.
 - g. Inspect the melt pattern for uniformity and immediately insert the pipe squarely and fully into the socket of the fitting until the fitting contacts the cold ring. Do not twist the pipe or fitting during or after the insertion.
 - h. Hold or block the pipe in place during cooling.
6. Electrofusion:
- a. Unless the operation is for a saddle-type electrofusion joint, pipe ends shall be faced square to establish clean, parallel mating surfaces.
 - b. Clamp the pipe and fitting at the proper position in the fixture.
 - c. Connect the electrofusion control box to the fitting and to the power source. Apply the electric current using manufacturer's instructions.
 - d. Allow the joint to cool before removing the clamping fixtures.

3.07 INSTALLATION OF VALVES

- A. Install gate valves conforming to AWWA C500 and UL 262 in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix (Installation, operation, and Maintenance of Gate Valves) to AWWA C509.
- B. Install gate valves conforming to AWWA C509 in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix (Installation, Operation, and Maintenance of Gate Valves) to AWWA C509.

- C. Install gate valves on PVC water mains in addition in accordance with the recommendations for appurtenance installation in AWWA Manual M23, Chapter 7, "Installation."
- D. Install check valves in accordance with the applicable requirements of AWWA C600 for valve-and-fitting installation, except as otherwise indicated.
- E. Provide and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

3.08 INSTALLATION OF VALVE AND METER BOXES

- A. Boxes shall be centered over the appurtenance so as not to transmit shock or stress. Covers shall be set flush with the surface of the finished pavement, or as shown in the Construction Documents. Backfill shall be placed around the boxes and compacted to the specified level in a manner that will not damage or displace the box from proper alignment or grade. Misaligned boxes shall be excavated, plumbed, and backfilled at no additional cost to the Owner.

3.09 INSTALLATION OF HYDRANTS

- A. Install hydrants, except for metal harness, plumbed vertical, in accordance with AWWA C600 for hydrant installation and as indicated.
- B. Provide and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Hydrants shall be set so that mounting bolts clear the top of finished grade by three inches so bolts may be easily replaced if needed.
- C. Provide metal harness as specified under pipe anchorage requirements for the respective pipeline material to which hydrant is attached.

3.10 SERVICE LINE CONNECTIONS TO WATER MAINS

- A. Connect service lines of size shown on plans to the main with a rigid connection or a corporation stop and gooseneck. Install a gate valve on the service line.
- B. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps.
- C. Connect service lines to PVC plastic water mains in accordance with UNI-B-8 and the recommendations of AWWA Manual M231, Chapter 9, "Service Connections."

3.11 INSTALLATION OF BACKFLOW PREVENTERS

- A. Devices shall be installed horizontal and level, with three feet minimum clearances from obstructions.

3.12 HYDROSTATIC PIPELINE TESTING

- A. Requirements:
 - 1. After the pipe has been laid and backfilled, perform hydrostatic pressure tests.
 - 2. Do not conduct tests until at least 12 hours have elapsed since pipe lying and at least 5 days have elapsed since placing of concrete thrust blocks.
 - 3. Fill the pipe with water which shall remain without external application of pressure for 24 hours before tests are conducted.

4. Prior to hydrostatic testing, flush pipe system with fresh water until piping is free of dirt and foreign matter.
5. Apply pressure by a pump and measured by a test gage. All necessary apparatus and labor for conducting the pressure and leakage tests shall be furnished by the Contractor.
6. Ensure the release of air from the line during filling, and prevent collapse due to vacuum when dewatering the line.
7. For pressure test, use a hydrostatic pressure not less than 200 psi. The duration of the test shall not be less than 4 hours with the variation in pressure of not more than 5 psi for the duration of the test.

B. Leakage Tests:

1. Perform tests at the same time as pressure tests.
2. Leakage rate shall be measured for at least 4 hours with a certified water meter, or other approved method. If requested, meter certification shall be submitted to the Owner's Representative for approval prior to testing.
3. Leakage shall not be measured by a drop in pressure in a test section over a period of time.
4. Leakage at mechanical couplings and joints, tapping sleeves, saddles, flanged joints, and copper piping will not be accepted. Correct any visible leaks.
5. Push-on joints: Test ductile iron pipe for leakage in accordance with AWWA C600 as shown in the following table:

TABLE 1

Allowable Leakage per 1000 feet of DIP Pipeline (Gal/Hr)

Average Test Pressure (psi)	Nominal Pipe Diameter - Inches									
	3	4	6	8	10	12	14	16	18	20
300	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60
275	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12

6. When the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.
7. Test polyvinyl chloride pipe for leakage in accordance with the recommendations of the Uni-Bell Plastic Pipe Association (UNI) as shown in the following table:

TABLE 2

Allowable Leakage per 1000 feet or 50 joints of PVC Pipeline (Gal/Hr)

Nominal Pipe Size (inches)	Average Test Pressure in Line (psi.)	
	200	250
4	0.38	0.43
6	0.57	0.64
8	0.76	0.85
10	0.96	1.07
12	1.15	1.28
14	1.34	1.50
16	1.53	1.71
18	1.72	1.92
20	1.91	2.14

8. Should any section of new pipe fail to pass either test, locate and repair the defective pipe and repeat the test.

3.13 STERILIZATION AND FLUSHING

A. General:

1. Domestic water lines, mains, and branches by chlorination in accordance with AWWA C601 and as herein specified.

B. Sterilization Methods:

1. Liquid Chlorine Solution Method:

- a. Flush all foreign matter from mains, branch runs, hydrant runs, and installed services.
- b. Introduce liquid chlorine solution at appropriate locations to assure uniform distribution through the facilities at the proper concentration.
- c. Do not use installed copper service lines to convey the concentrated chlorine solution to the mains.
- d. The sanitizing solution shall be retained in the facilities for a period of 24 hours after which each service, hydrant run, branch run and dead end shall be flushed until:
 - i. Residual chlorine is less than 1 part per million.
 - ii. Residual chlorine is no greater than the concentration of chlorine in the water supplied for flushing.
- e. Chlorine shall be a 1 percent solution (containing 10,000 parts per million available chlorine) or shall be obtained by use of dry chlorine in tablet form firmly attached to inside top of the pipe.

- f. The required concentration of chlorine in the pipe is 50 parts per million. This concentration may be attained by adding 5 gallons of the chlorine solution to 1,000 gallons of water.
- g. The weight of chlorine or chlorine compound required to make a 1 percent chlorine solution is as follows:

TABLE 3

One-Percent Chlorine Solution Mix

AMOUNT OF PRODUCT COMPOUND		QUANTITY OF WATER (in gallons)
High-Test Calcium Hypochlorite	1 pound	7.50
Chlorinated Lime (32-35% Cl)	2 pounds	7.50
Liquid Laundry Bleach (5.25% Cl)	1 gallon	4.25
Liquid Chlorine (100% available chlorine)	0.62 pounds	7.50

2. HTH Tablet Method:

- a. The required concentration of chlorine in the mains may be obtained by the use of HTH tablets as produced by Olin Mathieson in the following quantities or equivalent:

TABLE 4

HTH Tablet (70%) Dosage

Number of Tablets Per Length of Pipe

Length of Section	DIAMETER OF PIPE				
	4 inches	6 inches	8 inches	10 inches	12 inches
13 feet	1	2	3	4	6
18 feet	1	2	3	5	6
20 feet	1	2	3	5	7
30 feet	2	3	5	7	10
36 feet	2	3	5	8	12
40 feet	2	4	6	9	14
100 feet	4	9	15	23	30

- b. Tablets are to be fastened to the inside top surface of each length of pipe using "Permatex No. 1" no earlier than the day pipe is laid.
- c. Tablets shall not be installed in the pipe and left overnight before laying and shall not be accessible at any time for casual pilferage by the general public or by children. Tablets shall be stored in a hermetically sealed container.
- d. The new water lines are to be slowly filled with water. Air is to be exhausted from each dead end, branch run, hydrant run, and installed service.

- e. Water shall be retained for a period of 24 hours, after which each service, hydrant run, branch run and dead end shall be thoroughly flushed to clear foreign matter and until:
 - i. Residual chlorine concentration is less than 1 part per million.
 - ii. Residual chlorine is no greater than the concentration of chlorine in the water supplied for flushing.

C. Bacteriological Testing:

1. Samples shall be gathered and tests conducted at the expense of the Contractor by a laboratory certified by the California Department of Health Services as an Environmental Testing Laboratory (ELAP).
2. Samples are to be taken at representative points as required by the Owner's Representative and authorities having jurisdiction.
3. The new water lines shall remain isolated and out of service until satisfactory test results have been obtained that:
 - a. Meet the requirements of the California Department of Health Services, Drinking Water Standards.
 - b. Owner's Representative has accepted the results as indicative of the bacteriological condition of the facilities.
 - c. If unsatisfactory or doubtful results are obtained from the initial sampling, repeat the chlorination process until acceptable test results are reported.

3.14 HYDRANT FLOW TESTING

- A. After completion of the pipe and hydrant installation and service connections, the new hydrants shall be flow tested and results provided to the Owner's Representative and Engineer. The Contractor shall provide the following information:
1. Who performed the test.
 2. Testing date.
 3. Hydrant location.
 4. Static pressure (psig).
 5. Residual pressure (psig).
 6. Flow (gpm).
 7. Orifice size (in).

3.15 UTILITY SERVICES VERIFICATION

- A. Contractor shall record location and meter number(s) of any new meters on an 8.5" x 11" site plan of the project site and submit to the Owner's Representative upon completion of the meter installations.

Attachments

- None

END OF SECTION

SECTION 33 31 00 SANITARY UTILITY SEWERAGE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. In the event of a conflict in specifications, Utility Provider Standard Specifications (most recent edition) shall govern.

1.02 SUMMARY

- A. Section Includes:
 - 1. Ductile-iron, gravity sewer pipe and fittings.
 - 2. Ductile-iron, pressure pipe and fittings.
 - 3. PVC pipe and fittings.
 - 4. Concrete pipe and fittings.
 - 5. Nonpressure-type transition couplings.
 - 6. Expansion joints and deflection fittings.
 - 7. Cleanouts.
 - 8. Concrete.

1.03 DEFINITIONS

- A. HDPE: High Density Polyethylene Pipe.
- B. PE: Polyethylene plastic.
- C. PVC: Polyvinyl chloride plastic.

1.04 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Pipe and fittings.
 - 2. Non-pressure couplings
 - 3. Expansion joints and deflection fittings.
 - 4. Cleanouts.

1.05 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings:
 - 1. Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- B. Product Certificates: For each type of pipe and fitting.
- C. Field quality-control reports.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.07 FIELD CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by District or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify District's Representative no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without District's Representative written permission.
- B. Environmental Requirements: Except by specific written authorization, cease concreting when descending air temperature in shade and away from artificial heat falls below 35 degrees F., and there is frost in subgrade. When concreting is permitted during cold weather, temperature of mix shall not be less than 60 degrees F at time of placing.
- C. Immediately pump or bail out water found in excavations, whether rain or seepage. Coordination and use of electric power is the Contractor's responsibility. Excavations must be kept free from water at all times.
- D. It shall be the responsibility of the Contractor to take all measures and furnish all equipment and labor necessary to control the flow, drainage and accumulation of water as required to permit completion of the work under this section to avoid damage to all work at no additional cost to the District. Contractor is responsible for discharge permit as required by local or State jurisdiction.

1.08 PROJECT RECORD DOCUMENTS

- A. Maintenance of Documents: Store documents apart from drawings used for construction. File submitted documents in accordance with the specifications' section numbers. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

- B. Recording: Label each document "PROJECT RECORD" in neat, large, printed letters. Record information concurrently with construction progress. Do not cover work until required information is recorded. Marking of project records shall be legible and with a dark pen or pencil. Ink shall not be water based due to easy smearing. Mark drawings to record actual construction including field dimensions, elevations, details, changes made by a modification, details not on original drawings, horizontal and vertical locations of underground utilities and appurtenances referenced to a minimum of two permanent surface improvements, and depths of various elements of work in relation to project datum. All horizontal and vertical information is to be certified by a professional land surveyor.
- C. Submission: Accompany submittal with transmittal letter in duplicate containing date, project title and number, Contractor's name, address and telephone number, title and number of each record document, and signature of Contractor or his authorized representative. Contractor shall submit two drawings and certification of data by a Professional Land Surveyor depicting all as built information to the Engineer.

1.09 PROTECTION

- A. Barricades and Safety Provisions: Place and maintain until completion of work adequate barricades, construction signs, warning lights and guards to avoid property damage and to protect persons from injury. Flares with open flames will not be permitted. Protect all materials, equipment, pipe, and earth piles that may serve as hazards to vehicular or pedestrian traffic by barricades or guards and warning lights.
- B. Utilities: Protect from damage existing utility lines shown on drawings or locations of which are made known to contractor prior to work, and utility lines constructed during construction operations of the project. Hand excavate within 6-inches of known piping or objects to prevent damage from equipment. Before commencing work, obtain information concerning location, type, and extent of concealed existing utilities on the site and adjacent properties. Repair damage to utilities at no cost to the District.
- C. Drainage: Maintain the excavations and site free from water throughout the work. Remove any water encountered in the trench to provide firm subgrade, to permit joints to be made dry at the final grade, and to prevent entrance of water into the pipeline. Rock, gravel, and other appurtenances used to keep trenches free from water or used to add support to installed piping is considered incidental to construction and all costs shall be the responsibility of the Contractor.
- D. Survey Control Range Boxes: Protect existing survey control monuments from damage. Contractor will be responsible for replacement or repair of any monument damaged or destroyed. Replacement of monuments must be performed by a qualified land surveyor.

PART 2 - PRODUCTS

2.01 DUCTILE-IRON, GRAVITY SEWER PIPE AND FITTINGS

- A. Pipe: ANSI Designation A21.51 minimum pressure Class 350 for pipe 12 inches and smaller in diameter and minimum pressure Class 250 for pipe greater than 12 inches in diameter.
- B. Standard Fittings: AWWA C110/A21.10, ductile or gray iron, for push-on joints.
- C. Compact Fittings: Standardized mechanical joint assemblies shall conform to the applicable requirements of ANSI Standards for the pipe specified and ANSI Standard A21.11.

- D. Gaskets: AWWA C111/A21.11, rubber.

2.02 PVC PIPE AND FITTINGS

A. PVC Cellular-Core Sewer Piping:

1. Pipe: All PVC solid wall pipe and fittings shall be in accordance with the requirements for SDR 26 sewer pipe as stated in ASTM Designation D-3034, minimum wall thickness of SDR 26, ASTM Designation F-789 Type PS-46, or the requirements for PVC pressure pipe. Pipe joints and fittings shall be factory assembled, integral wall bell and spigot configuration, compatible with the pipe.
2. Fittings: ASTM D 3034, SDR 26.

B. PVC Profile Sewer Piping:

1. Pipe: ASTM F 794, PVC profile, gravity sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

C. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, SDR 26, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

D. PVC Gravity Sewer Piping:

1. Pipe and Fittings: ASTM F 679, wall thickness based on a pipe stiffness of 115 psi, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

2.03 NONPRESSURE-TYPE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling; for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and include corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2. For Concrete Pipes: ASTM C 443, rubber.
3. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.

5. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded, Flexible Couplings:
1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
- D. Shielded, Flexible Couplings:
1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
- E. Ring-Type, Flexible Couplings:
1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.04 EXPANSION JOINTS AND DEFLECTION FITTINGS

- A. Ductile-Iron, Flexible Expansion Joints:
1. Description: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110/A21.10 or AWWA C153/A21.53. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig minimum working pressure and for offset and expansion indicated.
- B. Ductile-Iron Expansion Joints:
1. Description: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110/A21.10 or AWWA C153/A21.53. Include rating for 250-psig minimum working pressure and for expansion indicated.
- C. Ductile-Iron Deflection Fittings:
1. Description: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C110/A21.10 or AWWA C153/A21.53. Include rating for 250-psig minimum working pressure and for up to 15 degrees of deflection.

2.05 CLEANOUTS

- A. Cast-Iron Cleanouts:
1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
 2. Top-Loading Classification(s): Heavy Duty and Extra-Heavy Duty.
 3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. PVC Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.06 CONCRETE

- A. General: Contractor is responsible for replacement of curb, gutter, sidewalks and cross pans as per authority having jurisdiction.
- B. General: Precast concrete sections shall be in accordance with the Standard Details and shall conform to the requirements of ASTM Designation C-487 except that Type II or Type V Portland Cement shall be used.
- C. The cone section shall be concentric unless eccentric is allowed by the Engineer., and the following:
1. Cement: ASTM C 150/C 150M, Type II.
 2. Fine Aggregate: ASTM C 33/C 33M, sand.
 3. Coarse Aggregate: ASTM C 33/C 33M, crushed gravel.
 4. Water: Potable.
- D. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
1. Reinforcing Fabric: ASTM A 1064/A 1064M, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.
- E. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
1. Reinforcing Fabric: ASTM A1064/A 1064M, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.
- F. Job Mixed Concrete will not be allowed
- G. Ready Mixed Concrete: Proportioned, mixed, and transported in accordance with ASTM C94. Any concrete not plastic and workable when it reaches project shall be rejected.
- H. Expansion Joint Material: AASHTO M173.
- I. Curing Materials:
1. Burlap Cloth from Jute or Kenaf: AASHTO M182.
 2. White Liquid Membrane: AASHTO M148, 1 gal/150 SF.
 3. Sheet Materials: AASHTO M171, 4 mil.

2.07 MORTAR

- A. The mortar shall consist of one-part cement, 0.15 part lime, and three parts sand, measured by volume. The cement, lime and sand shall be first mixed dry to a uniform color in a suitable box or batch mixer and then mixed with water thoroughly; the water being added gradually until the required consistency is obtained. Mortar shall be mixed in batches of such size as will be used immediately. Retempered mortar, or any mortar which has been mixed for more than one-half hour shall not be used. When mortar is molded into briquettes one square-inch in cross-section, it shall attain an ultimate tensile stress of 125 pounds per square-inch after one day in air and six days in water, and 175 pounds per square-inch after one day in air and twenty-seven days in water.

PART 3 - EXECUTION

3.01 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 31 20 00 - EARTH MOVING.

3.02 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details to indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 3. Install piping with 36-inch minimum cover.
 - 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - 5. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."

6. Install ductile-iron, gravity sewer piping according to ANSI Designation A21.51.
 7. Install ABS sewer piping according to ASTM D 2751.
 8. Install HDPE sewer piping according to AWWA C906 and ASTM D-3035.
 9. Install PVC cellular-core sewer piping according to ASTM Designation D-3034.
 10. Install PVC corrugated sewer piping according to ASTM F 949.
 11. Install PVC profile sewer piping according to ASTM F 794.
 12. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
 13. Install PVC gravity sewer piping according to ASTM F 679.
 14. Install fiberglass sewer piping according to ASTM D 3839 and ASTM F 1668.
- G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105/A21.5:
1. Hub-and-spigot, cast-iron soil pipe.
 2. Hubless cast-iron soil pipe and fittings.
 3. Ductile-iron pipe and fittings.
 4. Expansion joints and deflection fittings.
- H. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.03 UTILITIES ENCOUNTERED

- A. Protection of all existing gas, water, sewer services, culverts, drains, cable, telephone lines, and electric lines encountered during construction is the Contractor's responsibility, and if utilities are disturbed, they shall be maintained and/or restored to original condition at his expense. Backfill around utilities shall be adequately compacted to assure permanent stability.

3.04 WATER LINE CROSSING

- A. Normal Conditions: Whenever possible, lay sanitary sewer under water main to provide vertical separation of at least 18" between invert of water main and crown of sewer.
- B. Unusual Conditions: If above separation cannot be met, use the following:
1. Sewer passing over or less than 18" under water main:
 - a. One continuous length of watertight pipe 18-feet to 20-feet long centered on water main. Joints between different pipes encased in concrete 6-inches thick and extending 6-inches either side of joint; or
 - b. Sewer pipe encased in 6-inches of concrete around pipe, and extend 10-foot either side of water main.

2. Water mains passing under sewers: If vertical separation less than 18-inches, provide structural support for sewer.

3.05 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 1. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
 2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
 3. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
 4. Join ductile-iron, gravity sewer piping according to AWWA C600 for push-on joints.
 5. Join ABS sewer piping according to ASTM D 2321 for elastomeric-seal joints.
 6. Join PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 891 for solvent-cemented joints.
 7. Join PVC corrugated sewer piping according to ASTM D 2321.
 8. Join PVC profile sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 9. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 10. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 11. Join fiberglass sewer piping according to ASTM D 4161 for elastomeric-seal joints.
 12. Join nonreinforced-concrete sewer piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
 13. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
 14. Join dissimilar pipe materials with nonpressure-type, flexible or rigid couplings.
- B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Un-shielded flexible or rigid couplings for pipes of same or slightly different OD.
 - b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.

- c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.06 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ASTM C94.

3.07 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads, loading docks, other vehicular areas.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.08 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 of INC #4 (DSA#01-116833)
- B. Connect force-main piping to building's sanitary force mains specified in Division 22 of INC #4 (DSA#01-116833)
- C. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of, and be flush with, inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

- a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.09 CLOSING ABANDONED SANITARY SEWER SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - 1. Close open ends of piping with at least 8-inch-thick, brick masonry bulkheads.
 - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
 - 1. Remove manhole and close open ends of remaining piping.
 - 2. Remove top of manhole down to at least 36 inches below final grade. Fill to within 6 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Section 31 20 00 - EARTH MOVING.

3.10 IDENTIFICATION

- A. Comply with requirements in Section 31 20 00 - EARTH MOVING for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 - 1. Use green detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.11 TRAFFIC REGULATION

- A. Conformance: "Manual of Uniform Traffic Control Devices," U.S. Department of Transportation, or applicable statutory requirements of authority having jurisdiction.
 - 1. Unless otherwise authorized, keep at least one lane of traffic open at all times.
 - 2. When work is not in progress, keep all traffic lanes open.
- B. Keep traffic areas free of excavated material, construction equipment, pipe, and other materials and equipment.
- C. Warning Signs and Lights: Protect all roadways by effective barricades on which are placed acceptable warning signs. Provide suitable barricades and warning signs for open trenches,

other excavations, and obstructions. Illuminate by means of warning lights all barricades and obstructions from sunset to sunrise. Flagmen where required are to provide for public safety and regulation of traffic.

- D. Roadway Usage Between Operations: At all times when work is not actually in progress, Contractor shall make open, passable, and maintain to traffic such portions thereof as may be agreed upon between Contractor and all other authorities or parties having jurisdiction over properties involved.

3.12 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate report for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - 4. Submit separate report for each test.
 - 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
 - b. Close openings in system and fill with water.

- c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
- a. Test plastic gravity sewer piping according to ASTM F 1417.
 - b. Test concrete gravity sewer piping according to ASTM C 1628.
7. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig.
- a. Ductile-Iron Piping: Test according to AWWA C600, "Hydraulic Testing" Section.
 - b. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
8. Manholes: Perform hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.13 CLEANING

- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

Attachments

- None

END OF SECTION

SECTION 33 41 00 STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. California Department of Transportation (Caltrans) Standard Specifications:
 - 1. Section 51: Concrete Structures.
 - 2. Section 52: Reinforcement.
 - 3. Section 55: Steel Structures.
 - 4. Section 70: Miscellaneous Facilities.
 - 5. Section 72: Slope Protection.
 - 6. Section 75: Miscellaneous Metal.
 - 7. Section 90: Portland Cement Concrete.

1.02 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Nonpressure transition couplings.
 - 3. Expansion joints and deflection fittings.
 - 4. Cleanouts.
 - 5. Drains.
 - 6. Encasement for piping.
 - 7. Manholes.
 - 8. Channel drainage systems.
 - 9. Catch basins.
 - 10. Stormwater inlets.
 - 11. Pipe outlets.

1.03 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - 1. Manholes: Include plans, elevations, sections, details, frames, and covers.
 - 2. Catch basins, stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.
 - 3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames, covers, design calculations, and concrete design-mix reports.

1.05 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- B. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet (1:500) and vertical scale of not less than 1 inch equals 5 feet (1:50). Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- C. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
- D. Field quality-control reports.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.07 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Municipality and District no fewer than three days in advance of proposed interruption of service.

2. Do not proceed with interruption of service without Municipality written permission.

PART 2 - PRODUCTS

2.01 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service and Extra-Heavy classes.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.02 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI-Trademarked, Shielded Couplings:
 1. Description: ASTM C 1277 and CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Heavy-Duty, Shielded Couplings:
 1. Description: ASTM C 1277 and ASTM C 1540, with stainless-steel shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- D. Cast-Iron, Shielded Couplings:
 1. Description: ASTM C 1277 and ASTM A 48, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.03 DUCTILE-IRON, CULVERT PIPE AND FITTINGS

- A. Pipe: ASTM A 716, for push-on joints.
- B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
- C. Compact Fittings: AWWA C153, for push-on joints.
- D. Gaskets: AWWA C111, rubber.

2.04 STEEL PIPE AND FITTINGS

- A. Corrugated-Steel Pipe and Fittings: ASTM A 760, Type I with fittings of similar form and construction as pipe.
 1. Special-Joint Bands: Corrugated steel with O-ring seals.
 2. Standard-Joint Bands: Corrugated steel.
 3. Coating: Zinc.

2.05 PVC PIPE AND FITTINGS

- A. PVC Corrugated Sewer Piping:
 - 1. Pipe: ASTM F 949, PVC, corrugated pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM F 949, PVC molded or fabricated, socket type.
 - 3. Gaskets: ASTM F 477, elastomeric seals.
- B. PVC Profile Sewer Piping:
 - 1. Pipe: ASTM F 794, PVC profile, gravity sewer pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM D 3034, PVC with bell ends.
 - 3. Gaskets: ASTM F 477, elastomeric seals.
- C. PVC Type PSM Sewer Piping:
 - 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM D 3034, SDR-26, PVC with bell ends.
 - 3. Gaskets: ASTM F 477, elastomeric seals.
- D. PVC Gravity Sewer Piping:
 - 1. Pipe and Fittings: ASTM F 679, T-1 wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.
- E. PVC Pipe Reducer:
 - 1. Pipe reducer: ASTM D-3034, SDR 35, PVC pipe.
 - 2. Fittings: J-M Manufacturing Co. Concentric Increaser (G & G or G & S), or approved equivalent.

2.06 CONCRETE PIPE AND FITTINGS

- A. Nonreinforced-Concrete Sewer Pipe and Fittings: ASTM C 14, Class 3, 1350-D, with tongue and groove or bell-and-spigot or flanged ends and gasketed joints with ASTM C 443 rubber gaskets.
- B. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.
 - 1. Bell-and-spigot or flanged ends and gasketed joints with ASTM C 443, rubber gaskets.

2.07 NONPRESSURE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 - 1. For Concrete Pipes: ASTM C 443, rubber.
 - 2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - 3. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 4. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 5. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded, Flexible Couplings:
 - 1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
- D. Shielded, Flexible Couplings:
 - 1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
- E. Ring-Type, Flexible Couplings:
 - 1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.08 EXPANSION JOINTS AND DEFLECTION FITTINGS

- A. Ductile-Iron Flexible Expansion Joints:
 - 1. Description: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig minimum working pressure and for offset and expansion indicated.
- B. Ductile-Iron Expansion Joints:
 - 1. Description: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron or steel with protective coating, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Include rating for 250-psig minimum working pressure and for expansion indicated.
- C. Ductile-Iron Deflection Fittings:

1. Description: Compound-coupling fitting, with ball joint, flexing section, gaskets, and restrained-joint ends, complying with AWWA C110 or AWWA C153. Include rating for 250-psig minimum working pressure and for up to 15 degrees of deflection.

2.09 BACKWATER VALVES

A. Cast-Iron Backwater Valves:

1. Description: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
2. Horizontal type; with swing check valve and hub-and-spigot ends.
3. Combination horizontal and manual gate-valve type; with swing check valve, integral gate valve, and hub-and-spigot ends.
4. Terminal type; with bronze seat, swing check valve, and hub inlet.

B. Plastic Backwater Valves:

1. Description: Horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.

2.10 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Light Duty, Medium Duty, Heavy Duty and Extra-Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. Plastic Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.11 DRAINS

A. Cast-Iron Area Drains:

1. Description: ASME A112.6.3 gray-iron, round body with anchor flange and round grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
2. Top-Loading Classification(s): Medium and Heavy Duty.

2.12 ENCASEMENT FOR PIPING

- ### **A. Standard: ASTM A 674 or AWWA C105.**

- B. Material: Linear low-density polyethylene film of 0.008-inch minimum thickness.
- C. Form: Sheet or tube.
- D. Color: Any.

2.13 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints. Shall conform to Section 70-1.02H and 71-1.07 of the Caltrans Standard Specifications.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 24 inches
10. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Designed Precast Concrete Manholes:

1. Description: ASTM C 913; designed according to ASTM C 890 for A-16 (AASHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.
2. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole as required to prevent flotation.
3. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

4. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
5. Steps: Individual FRP wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 24 inches.
6. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
7. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope.

C. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch-minimum width flange and 26-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER", 2" high.
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

2.14 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:
 1. Cement: ASTM C 150, Type II.
 2. Fine Aggregate: ASTM C 33, sand.
 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
 1. Reinforcing Fabric: ASTM A 185, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.
- C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
 1. Reinforcing Fabric: ASTM A 185, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.

2.15 CHANNEL DRAINAGE SYSTEMS

- A. General Requirements for Polymer-Concrete, Channel Drainage Systems: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include quantity of units required to form total lengths indicated.
- B. Sloped-Invert, Polymer-Concrete Systems:
 - 1. Channel Sections:
 - a. Interlocking-joint, precast, modular units with end caps.
 - b. 4-inch inside width and deep, rounded bottom, with built-in invert slope of 0.6 percent and with outlets in quantities, sizes, and locations indicated.
 - c. Extension sections necessary for required depth.
 - d. Frame: Include gray-iron or steel frame for grate.
 - 2. Grates:
 - a. Manufacturer's designation "Heavy Duty," with slots or perforations that fit recesses in channels.
 - b. Material: Galvanized steel.
 - 3. Covers: Solid gray iron if indicated.
 - 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- C. Narrow-Width, Level-Invert, Polymer-Concrete Systems:
 - 1. Channel Sections:
 - a. Interlocking-joint, precast, modular units with end caps.
 - b. 5-inch inside width and 9-3/4-inch- deep, rounded bottom, with level invert and with NPS 4 outlets in quantities, sizes, and locations indicated.
 - 2. Grates:
 - a. Slots or perforations that fit recesses in channels.
 - b. Material: Galvanized steel.
 - 3. Covers: Solid gray iron if indicated.
 - 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- D. Wide-Width, Level-Invert, Polymer-Concrete Systems:

1. Channel Sections:
 - a. Interlocking-joint, precast, modular units with end caps.
 - b. 8-inch inside width and 13-3/4-inch-deep, rounded bottom, with level invert and with outlets in quantities, sizes, and locations indicated.
 2. Grates:
 - a. Slots or other openings that fit recesses in channels.
 - b. Material: Gray iron.
 3. Covers: Solid gray iron if indicated.
 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- E. Drainage Specialties: Precast, polymer-concrete units.
1. Large Catch Basins:
 - a. 24-by-12-inch polymer-concrete body, with outlets in quantities and sizes indicated.
 - b. Gray-iron slotted grate.
 - c. Frame: Include gray-iron or steel frame for grate.
 2. Small Catch Basins:
 - a. 19- to 24-inch by approximately 6-inch polymer-concrete body, with outlets in quantities and sizes indicated.
 - b. Gray-iron slotted grate.
 - c. Frame: Include gray-iron or steel frame for grate.
- F. Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.
- G. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

2.16 CATCH BASINS

- A. Standard Precast Concrete Catch Basins:
1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.

3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
 4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
 5. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
 6. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and grate.
 7. Steps: Individual FRP steps wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 24 inches.
 8. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
- B. Designed Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for joint sealants.
1. Joint Sealants: ASTM C 990, bitumen or butyl rubber.
 2. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and grate.
 3. Steps: Individual FRP steps wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 24 inches
 4. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
- C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.
1. Size: 24 by 24 inches minimum unless otherwise indicated.
 2. Grate Free Area: Approximately 50 percent unless otherwise indicated.
- D. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter flat grate with small square or short-slotted drainage openings.
1. Grate Free Area: Approximately 50 percent unless otherwise indicated.
 2. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and cover.

3. Steps: Individual FRP steps wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of structure to finished grade is less than 24 inches.
- E. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER", 2" high.

PART 3 - EXECUTION

3.01 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.02 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
 1. Install piping pitched down in direction of flow.
 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 3. Install piping with 30-inch minimum cover.
 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 5. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."

6. Install ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
7. Install PVC cellular-core piping according to ASTM D 2321 and ASTM F 1668.
8. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
9. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
10. Install fiberglass sewer piping according to ASTM D 3839 and ASTM F 1668.
11. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
12. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.03 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
 1. Join hub-and-spigot, cast-iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
 2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
 3. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
 4. Join ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
 5. Join PVC cellular-core piping according to ASTM D 2321 and ASTM F 891 for solvent-cemented joints.
 6. Join PVC corrugated sewer piping according to ASTM D 2321 for elastomeric-seal joints.
 7. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
 8. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 9. Join fiberglass sewer piping according to ASTM D 3839 for elastomeric-seal joints.
 10. Join nonreinforced-concrete sewer piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
 11. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
 12. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.04 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roadways.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.05 DRAIN INSTALLATION

- A. Install type of drains in locations indicated.
 - 1. Use Light-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
 - 2. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
 - 3. Use Heavy-Duty, top-loading classification drains in vehicle-traffic service areas.
 - 4. Use Extra-Heavy-Duty, top-loading classification drains in roadways.
- B. Embed drains in 4-inch minimum concrete around bottom and sides.
- C. Fasten grates to drains if indicated.
- D. Set drain frames and covers with tops flush with pavement surface.

3.06 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.07 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.08 STORMWATER INLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.

3.09 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.10 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 22 from Inc #4 (DSA# 01-116833)
- B. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- C. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Shielded flexible couplings for same or minor difference OD pipes.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.11 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads.
 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
1. Remove manhole or structure and close open ends of remaining piping.
 2. Remove top of manhole or structure down to at least 48 inches below final grade. Fill to within 24 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Section 312000 "Earth Moving."

3.12 IDENTIFICATION

- A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
1. Use detectable warning tape over ferrous piping.
 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.13 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924.
 6. Force-Main Storm Drainage Piping: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig.

- a. Ductile-Iron Piping: Test according to AWWA C600, "Hydraulic Testing" Section.
 - b. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.14 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

Attachments

- None

END OF SECTION



OUSD Fremont HS - #472

INCREMENT #4-A – Qualifications, Assumptions & Exclusions

February 18, 2021

(2/25/21) OUSD Comments

(3/2/21) CFJV Responses

(3/3/21) OUSD Comments

(3/4/21) AOR comments.

(3/8/21) CFJV Responses

(3/24/21) CFJV Responses in conversation w/ OUSD & AOR

GENERAL / DIVISION 1

1. **“GMP is based on the Increment #4-A Addendum 01 and 02 scope of work as defined in the bid set drawings and specifications prepared by LCA Architects and referencing the listed contract documents included in Exhibit A at the end of this document.”**

[PTO 2/18/21]: Replace increment #5 with “Inc #4-A”

2/25/21: CFJV agrees – qualification revised. [SN]

3/3/21: OUSD Agrees. [PTO]

3/4/21 LCA- GMP should also include Addendum 02.

3/8/2021: Addendum 02 included. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

2. **“~~Note the foam around the arched window jambs will need to be redesigned to accommodate this sequence in (2) parts. Costs for this (2) part jamb assembly have not been included in the base scope of work but are set aside in an Owner Allowance listed in the attached Owner Allowance log.”~~**

OUSD [PTO]: This concept seems to work for Kwall application per details. OUSD [PTO]: This note contradicts detail A5.01/11 Head detail A5.01/17 jamb detail? If the contractor's intent is to install the storefronts for the interior as component stick build storefront system, then this would be unnecessary? The DSA review comments were very stringent with regards to how the foam trim system must attach mechanically to the building? Additionally, these changes may require a CCD review from DSA and design from AOR, which the GC GMP line 09-2400 allowance does not pick up.

2/25/21: Non-issue for Kalwall elevation. For West elevation, we propose to pursue DSA deferred submittal exception for <10' windows as the first course of action via the Architect. Jamb modifications secondarily, like Walter's initial concept for a larger reveal at exterior performance joint. If DSA no longer requires a deferred submittal process for windows 10', this item can be removed. [SN]

3/3/21: OUSD. [PTO] AOR has informed the District with the following: After reviewing this further with upper management, we have a different approach regarding the deferred submittals. Due to the recent two-week turnaround response time of Addendum 01, we now believe submitting an Addendum 02 for the storefront window fastening/calculations would be a better approach than as a CCD.

We have requested a meeting with the DSA plan reviewer to discuss this new approach to make sure what required information is needed and avoid back check and confirm proceeding with approach removes storefront windows as a deferred submittal. For the window system with span not more than 10 feet, shop drawings are not required; only anchorage details and anchorage calculations are required.



For the storefront on the north side, mullion details and calculations, and anchorage details and calculations are needed. The entire package should be submitted as a deferred submittal – KalWall plus the structural engineer’s details and calculations.

3/3/21: OUSD Agrees. [PTO]

3/4/21 AOR Agrees.

3/24/21: Qual stricken. Sequencing resolved. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

3. **“We do not include permit fees, testing, special inspection fees, DSA Fees, utility connection fees, and engineering associated with the aforementioned.”**

3/2/21: (No comment provided) [SN]

3/3/21: OUSD Agrees. [PTO]

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

4. **“Schedule assumes a total of a ~~(2)~~ (1) week Architect review and ~~(5)~~ (3) weeks DSA review of deferred submittals for a total duration of ~~(7)~~ (4) weeks to get an approved submittal. Time frame is intended to include time for back-and-forth revisions if necessary.”**

[PTO]: Remove 5 days from AOR review. Remove 10 days from DSA review making it 3 weeks.

2/25/21: Schedule revised [SN]

3/3/21 OUSD Still under review pending outcome of item #2.

3/4/21 AOR Agrees with OUSD.

3/8/21: Schedule revised accordingly. Submitted to DSA (3/11/21). [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

5. **“We exclude any fees, taxes, levies, or tariffs, or any increases in fees, taxes, levies or tariffs, that were not legally enacted at the time bids were received. This exclusion includes, but is not limited to, voter-approved initiatives, bonds, or propositions, including homelessness gross receipts tax ordinances, if any.”**

OUSD [PTO]: The words tariffs should be omitted. Review of GMP indicates 03-3100/Rebar, 05-1000/S/S-Steel, & 26-0010 electrical material-equipment are front-ended which per contract documents 01 43 00 General Conditions sub section 104/F would apply.

2/25/21: CFJV contract language stipulates tariffs as a product of federal import economics and cannot be withdrawn. Please note tariff costs in previous increments were not passed on to OUSD. [SN]

3/3/21: OUSD. [PTO] Review of GMP indicates 03-3100/Rebar, 05-1000/S/S-Steel, & 26-0010 electrical material-equipment have been front-ended loaded which per contract documents 01 43 00 General Conditions sub section 104/F would apply.

3/4/21 AOR Agrees with OUSD.

3/8/21: CFJV is currently engaging early subcontractors providing rebar, steel, and lighting fixtures. We’ll work together for staging early procurement of materials. [SN]

3/4/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



6. **“We exclude costs for special inspection, third party window testing, hygienist fees, air testing and air monitoring.”**

OUSD [PTO]: Add additional Not to Exceed allowance line item to cover special inspections.
2/25/21: Special inspections need be contracted and carried by the owner as a 3rd party inspection. This is a conflict of interest for CFJV. [SN]
3/3/21: OUSD. [PTO] Special inspection requests will be routed through IOR. All inspection requests shall be detailed with supporting documents and requests shall be for coordinated by CFJV for full day and if necessary, half day inspections in a beneficial and agreeable manner. Failed and re-inspection are still subject to contract document requirements.
3/4/21 AOR Agrees with OUSD.
3/8/21: Agreed, CFJV to coordinate with IOR for site special inspections. [SN]
3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

7. **“Specification 01 52 13 Field Offices is excluded. We assume office space will be provided within the existing campus for both the contractor and IOR.”**

OUSD [PTO]: See Notes on GMP to remove costs for field offices, water, temporary power, Etc. “Temporary office space provided by OUSD site location no need for these costs.”
2/25/21: Field offices and trailer utilities have been removed from GMP. [SN]
3/3/21: OUSD Agrees. [PTO]
3/4/21 AOR Agrees with OUSD.
3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

8. **“In reference to specification 01 50 13, Construction Waste Management and Disposal: We cannot guarantee 85% Construction Waste Diversion. General construction debris will be deposited in a mixed C&D bin which will then be sorted at a recycling facility. The facilities typically divert 75% of materials. Concrete debris from hard demo will be sorted and diverted from landfill as applicable which will increase the overall 75% rate of the mixed C&D.”**

[PTO]: HazMat process dictated by the (AHJ). Concrete debris is subject to (AHJ) Lab characterization and classifications, cost of which is to be handled by Abatement company and inclusive of their costs within the GMP.
2/25/21: Section 01 50 13 includes non-hazardous construction waste only. [SN]
3/3/21: OUSD. [PTO] Agreed for non-hazardous waste. Concrete debris is subject to (AHJ) Lab characterization and classifications, cost of which is to be handled by Abatement company and inclusive of their costs within the GMP.
3/4/21 AOR Agrees with OUSD.
3/23/21: This is not a CHPS project and 75% was determined agreeable. Forthcoming Abatement Kickoff meeting will review hazmat waste. [SN]
3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

9. **“Schedule does not include any includes (6) days for adverse weather as the majority of the work occurs in the dry months of the year.”**

OUSD [PTO]: Add 10 days of weather contingencies to schedule.
2/25/21: Schedule revised with 10-day weather allowance. [SN]
3/3/21: OUSD Agreed. However, scheduling is subject to revision per Item #2 above and is being revised.
3/4/21 AOR Agrees with OUSD.
3/8/21: Schedule revised to 6 weather days per OUSD Optimization Comments (3/5/21). [SN]
3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



10. **“We do not include costs of temporary electrical and water for construction use. We assume the existing campus utilities can be utilized at no cost to the contractor.”**

[PTO]: See Notes on GMP to remove costs for field offices, water, temporary power, Etc. “Temporary office space provided by OUSD site location no need for these costs.”

2/25/21: Addressed in item #6. [SN]

3/3/21: OUSD Agrees. OUSD does not see relative information within Item #6 above. However, it was noted that the 01-5214 have been removed GMP.

3/4/21 AOR Agrees with OUSD.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

11. **“We do not include any coordination time with a MEP ~~or envelope~~ commissioning ~~agent~~.”**

[PTO]: Check with AOR with regards?

2/25/21: Electrical scope is lean. HVAC will be cleaned and balanced. MEP commissioning and Envelope Cx as a 3rd party inspection would be carried by the owner. Architect to confirm Cx requirements. [SN]

3/4/21 AOR LCA-No commissioning required for projects under 10,000 sf. However, the contractor will have to complete the Title 24 acceptance testing requirements for the light fixtures and their associated controls which would require coordination time.

3/3/21: OUSD Agrees with OAR, CFJV to revise accordingly.

3/24/21: CFJV assumes the estimated cost of \$3,000 for T24 and envelope consultants' coordination. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

12. **“Note items with a \$0 cost on our GMP summary are excluded as we understand them to be not applicable/included in the project.”**

OUSD [PTO]: Agreed.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

02-4000 – DEMOLITION & ABATEMENT

13. **“We do not include specification 023105 Trenching, Backfilling, and Compacting as it is not applicable.”**

OUSD [PTO]: Agreed.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

14. **“The following items are mentioned in spec 02 41 19, but not applicable for this project. We do not include temporary shoring for concrete saw cut, refrigerant recovery, ~~and~~ historic area. ~~demo steel tendons~~”**

[PTO]: If this is the case then specific section should be called out, IE: 3.02-A Refrigeration, ~~3.06-C~~ should be stricken, the balance of the specification section should remain intact.

2/25/21: Language updated, striking demo steel tendons (as anchors are in scope). [SN]

3/3/21: OUSD Agrees that IE: 3.02-A Refrigeration should be stricken; the balance of the specification section should remain intact. CFJV to revise accordingly.

3/4/21 AOR Agrees with OUSD.

3/8/21: 02 41 19, 3.04 B) and B.1) Temporary Shoring spec stricken. Temporary shoring at sawcutting locations is not included in the plans. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



- 14-A. “Owner shall remove all loose items, movable furniture, etc. from areas of work (including basement, 1st floor, 2nd floor) prior to our mobilization. This includes basement west and south elevation rooms, 1st floor construction area and offices on west elevation of Increment #1 area and Library south and west elevations.”

OUSD [PTO]: It was discussed with CFJV that they would need to include cost to move library books, furniture, and other items back from work areas as needed to perform scope of work.

2/25/21: 1st floor Office and 2nd floor library move is beyond CFJV purview. Purging, packing, protecting, and put back should be managed by the Owner. CFJV can advise as to clearances needed for scope for work and circulation. [SN]

3/3/21: OUSD Agrees. OUSD has already place books and item on rolling carts and moved 10-11' off areas to be worked on.

3/4/21 AOR Agrees with OUSD.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

15. “Our pricing includes removal of loose and peeled paint at exterior walls and windows (South & West Elevations), **ACM window compound**, and abatement at all baseboard and floor tile with mastic in the 1st floor remodeling areas. We do not include any other abatement work beside the ones listed above.”

OUSD [PTO]: Window glazing contains Asbestos, which is clearly called out in the provided “labs” and specifications-work plans and cannot be excluded.

2/25/21: Agreed. Language updated to capture ACM window compound is included. [SN]

3/3/21: OUSD Agrees ACC Environmental specification and work plan included.

3/4/21 AOR Agrees with OUSD.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

03-3100 – CONCRETE

16. “We do not include specification 03 33 00 – Architectural Concrete. Per response in RFC 23, this specification is not applicable.”

OUSD [PTO]: Agreed.

3/4/21 AOR Agrees with OUSD.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

17. “We include a \$40,000 CFJV allowance to renovate and patch the exterior façade and deal with spalling on the West and South Elevations as the extent of patching work will not be able to determine until after demolition of the existing cladding.”

OUSD [PTO]: OUSD assumption is that CFJV is demolishing existing parge coast as indicated on A2.01, correct? That this approximately 10% markup for 02-4000 for unknown? Please clarify.

2/25/21: During the course of demolition and anchor rod removal, there may be unanticipated spalling beyond the scope of exterior cladding and parge demolition. If the exterior façade requires repair beyond what the drawings describe, we would call upon this allowance. [SN]

3/3/21: OUSD Agrees.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

18. “We assume existing concrete is in adequate condition to accept drilling and epoxy of dowels and will pass specified pull test utilizing plan details.”

OUSD [PTO]: Agreed.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



19. **Add Qual: Slurry & Stripe.** [PTO]: ~~Add line item #4 Inc. #4 basketball courts will be slurred and restriped at no cost to OUSD, as this punch scope of work was held off until the Inc. #4 A construction has been completed.~~ **"We include the slurry and restripe of adjacent basketball courts as an open punch item from Increment #4 at no cost to OUSD."**

2/25/21: Qual added to capture this previous increment close out item: "We include the Increment #4 close out activities of slurry and restriping of adjacent basketball courts at the conclusion of the Library renovation with no GMP impact." [SN]

3/3/21: OUSD Agrees.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

05-1000 – STRUCTURAL STEEL AND MISC. IRON

20. **No structural steel specifications have been provided here. Hence, we rely on the structural plans/details.**

OUSD [PTO]: Agreed

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

06-2000 – FINISH CARPENTRY

21. **"We include 1-1/4" thick solid surface countertops, as noted in the Finish Legend on drawing A1.01. Specification 12 36 61 section 2.01 notes the countertops are to be 3/4" thick unless otherwise indicated."**

OUSD [PTO]: Agreed no conflict specification states unless otherwise noted which it is.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

07-2100 – INSULATION, FIRE STOPPING

22. **"We do not include rigid board insulation in Spec 07 21 00 section 2.02 per response in RFC No. 22."**

OUSD [PTO]: Agreed.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

07-5000 – ROOFING & WATERPROOFING

23. **"We include the deinstallation of existing roof tile and the reinstallation of existing tile for the sole purpose of gutter replacement. While we do not include additional roof base layer work or roof repair, we include a \$30,000 allowance for unforeseen tile and edge repair"**

OUSD [PTO]: Please provide an allowance to deal with underlayment 3' back of gutter line and unforeseen conditions.

2/25/21: Roof scope only includes the install of gutter at the western edge. Cahill requests best practice for clay tile removal and put back from roofing sub, and we include an allowance for breakage in GMP base. An additional \$30,000 allowance is proposed for additional tile removal and edge repair. [SN]

3/4/21 AOR Agrees.

3/3/21: OUSD Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



07-6000 – SHEET METAL, FLASHING, LOUVERS, AND EXPANSION JOINTS

24. **“Spec 07 62 00 section 1.06.A calls to warrant factory-applied finish to be 20-year from data of Substantial Completion. However, sheet metal products to be field painted. Hence, we do not include this warranty.”**

OUSD [PTO]: OUSD will assume that the Painters will be providing the 20-year warranty in this case, is that correct? GC states no.

2/25/21: Per the drawings and in conversation with the Architect, flashing will not be premium factory finished, but field painted. Paint warranty applies. [SN]

3/3/21: OUSD Agrees.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

08-1000 – DOORS, FRAMES AND HARDWARE

25. **“We assume the following items for Door Hardware Group 3:**
- a. Hinges: Ives 5BB1HW NRP
 - b. Panic device: Von Duprin (99 x Lever)
 - c. Closer: LCN 4040XP
 - d. Floor Stop: Ives FS439
 - e. Threshold: Zero 655A”

OUSD [PTO]: According to AOR this suggested hardware group is correct.

2/25/21: Ok. [SN]

3/3/21: OUSD Agrees, however all hardware must meet OUSD standards including keyway for cylinders.

3/4/21 AOR Agrees with OUSD.

3/8/21: CFJV agrees -- OUSD to provide keying schedule prior to ordering cylinders/cores. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

26. **“We include new sets of Door Hardware Group 3 at the (2) doors along the East elevation at Level 2 per 3/A1.01, as well as doors 101B and doors 101C per the door schedule.”**

OUSD [PTO]: Agreed AOR states there are (4) doors not 2.

3/2/21: Addendum 1 sheet notes indication (2) single doors on Level 2, receiving hardware. Door schedule does not carry these additions. Architect to confirm. [SN]

3/4/21 AOR LCA- My mistake on my last response. This item is correct, however, to clarify there are now a total of (6) doors with hardware group 3 due to Addendum 01 which added two additional sets.

3/3/21: OUSD Agrees.

3/8/21: Qual revised: “We include new sets of Door Hardware Group 3 at the (2) doors along the East elevation at Level 2, doors 101B, and doors 101C.”

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

08-4000 – WINDOWS, STOREFRONTS, GLAZING

27. **“Note we have listed MAZ glazing as our storefront and KalWall vendor at a \$24,350 premium over R&S Glazing. MAZ is an SLBE subcontractor and has committed to quicker procurement times over R&S Glazing. R&S Glazing was our subcontractor for Increment #1 and they were a problematic subcontractor.”**

OUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



28. **“We assume existing panic hardware at 101B & 101C is in good working condition. We include modification of parts at the panic device to include dogging function. We do not include replace the whole panic devices at these openings. Note that warranty will not be provided for modification at existing hardware.”**

OUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

29. **“We include 1-inch nominal unit thickness with 1/4-in thick tempered glass inner lite for insulated glasses at all storefront windows per response in RFC 29. We do not include any 1 1/4-in nominal insulated glass.”**

OUSD [PTO]: What are the benefits versus deterrents of using 1” with ¼” laminated on interior side? Versus just using 1” nominal?

2/26/21: RFC item # 29 Architect’s response confirms ” All insulated glazing units to be 1” thick with 1/4” thick tempered glass inner lite” in accordance with spec 08 80 00. [SN]

3/3/21: OUSD Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

30. **“We assume window testing with spray test only will be required at storefronts and Kalwall system. We do not include costs for a 3rd party inspection as this is typically by the District.”**

OUSD [PTO]: Agreed KDI will perform AAMA-501.2 test.

3/3/21: OUSD Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

31. **“We include Kalwall Translucent Glazing based off using Rectangular Shoji Standard 12” x 24” nominal grid pattern as already approved in the submittal process. The specified Verti-Kal grid has a maximum of 10’-0” panel height. Hence, we do not include Verti-Kal Grid.”**

OUSD [PTO]: AOR to advise.

2/26/21: Architect has approved Kalwall deferred submittal with shoji grid for DSA submission.

Architect to confirm. [SN]

3/3/21: OUSD Agrees.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

32. **“We include Butyle caulk at perimeter of Kalwall Translucent Glazing. Per Manufacturer’s rep, they do not use backer rod and caulking as called on in detail 23/A5.01. “**

OUSD [PTO]: Any sealant system requires backer rod to avoid (3) sided adhesion issues. Please revise accordingly.

2/26/21: Architect has approved revised Kalwall deferred submittal with BCF (black butyl coated foam) tape behind head trim for DSA submission. Architect to confirm. [SN]

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

33. **“We include 30-psf wind loads at Kalwall Translucent Glazing. This wind load requirement will not be able to determine until structural calculation is complete. Note that the Kalwall Translucent Glazing at the gym was 28-psf. Hence, we assume 30-psf is sufficient.”**

OUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



09-22000 – METAL STUD FRAMING, DRYWALL, AND FIREPROOFING

34. **“We do not include fireproofing of any exposed steel members, per the response to RFC item #28.”**

OUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

35. **“We do not include new interior furring wall at Level 1 windows [ref. 15/A5.01]. We assume the these are existing and no additional wall required.”**

OUSD [PTO] Agreed; however, aluminum stool and apron may need to extend downward.

2/26/21: Aluminum stool detail includes downturn at wall face. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

36. **“We include a \$4,300 allowance for pony walls at the solid surface countertops per 3/S5.01. These pony walls are not clearly shown on the architectural wall sections or details.”**

OUSD [PTO]: Architect to confirm intent.

2/26/21: Per the Architect, pony wall is meant for solid surface counters on south side by the Kalwall on level 2. Owner allowance is not carried. Qualification has been removed. [SN]

3/3/21: OUSD understands this is base scope of work included in GMP.

3/8/21: Included in the GMP base. Will remove from Qualifications. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

37. **“We do not include drywall furring around windows, as we believe it to be plaster patching. We include an allowance for built in bookcases that are at risk for damage from shotcrete.”**

OUSD [PTO]: Is CFJV referring to details #11 & #11 on a5.01? If so, did CFJV include a plaster system within its costs to refinish after window installation? Wouldn't it benefit all parties to utilized solid blocking and wooden trim pieces to create a jamb extension and casing made of MDO?

2/26/21: Existing condition finish material at window wall is plaster. Plaster patch is believed to provide to most appropriate patch in materiality and dimension. Architect to confirm intent and acceptable put back material. [SN]

LCA- Incorrect. Drywall furring occurs on interior side as noted on 3/A3.01, 2/A3.02 & 11, 17, 13/A5.01

3/3/21: OUSD Agrees with LCA.

3/24/21: Concrete head beam at arched window understood as the full radius, wrapping three sides of the window, to rest on sill/wall thickness. CFJV to provide a \$/SQFT and area estimate for plaster patch at West wall. Built in bookcases are at risk to damage due to shotcrete and demo on 3 sides. CFJV anticipates bookcase demo and will include an allowance for bookcase replacement.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

09-2400 -- EXTERIOR PLASTER

38. **“We assume all trims and accessories are galvanized. We do not include zinc materials.” We include a \$10,000 add for zinc materials in lieu of galvanized for all trims and accessories.”**

OUSD [PTO]: Specification section 09 22 36.23, 2.03A calls for “Comply with ASTM C1063, minimum 26-gauge galvanized steel or zinc alloy. OUSD prefers Zinc accessories consistent with other increments. Revise accordingly.

2/26/21: Metal lath and accessories would be buried in parge under Dryvit assembly. We priced galvanized with the subcontractor given the lack of weather exposure.. Zinc premium is estimated to be \$10,000 add to GMP. Confirm zinc alloy still a requirement or if galv is accepted. [SN]

LCA- Proceed with zinc per OUSD standards and other increments.

3/3/21: OUSD Agrees with LCA.

3/8/21: \$10,000 added to GMP for Exterior Plaster scope's zinc accessories. Qual revised: “Trim and accessories are zinc at a material cost increase to galvanized.” [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



39. **“We do not include decorative plaster repair. Our intent is to remove and reinstall. If replacement is necessary, we have set aside an Owner Allowance to cover these costs.”**

OUSD [PTO]: #4 Specify just what plaster you are referring to, interior decorative plaster? How does this relate to plaster patching in section 09-22000?

2/26/21: Owner's Allowance and decorative repair references Interior plaster conditions: ie. cast capitals at arched windows will not be reinstalled. Plaster patch at windows (09-2200, item #38) proposes a clean, modern finish like drywall. We will remove this Owner Allowance from the GMP Bid and revise qual. Qualification to read: “We do not include exterior or interior decorative plaster repair. Our intent is to remove and reinstall new.” [SN]

3/3/21: OUSD understands that new exterior rubber-foam decorative trims with plaster topping are included in base scope.

3/8/21: Agreed -- exterior foam trim is included in base. Qualification refers only to decorative plaster. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

40. **“We include Specification 07 14 16 – Elastomeric Liquid Waterproofing (Laticrete) only at tile installation per RFC No. 60 response.”**

OUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

41. **“We include Specification 09 96 00 Dryvit Textured Acrylic Finishes: Dryvit TAFS ii System with parge coat over the existing concrete exterior.”**

OUSD [PTO]: #6 Agreed pending response to 03-3100 #2.

3/1/21: Please see Item # 17 response. Spalling allowance is unrelated to anticipated scope of Dryvit & parge. Given Spec 09 24 00 Portland Cement Plaster is stricken as “Not Used” from the Table of Contents, we will remove this qualification. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

09-3000 -- TILE & STONE

42. ~~“Per subcontractor, epoxy grout is not appropriate for exterior applications and we include a cement grout at exterior tile. Due to product lead times we include a Fireclay Tile substitute with a final color to be selected, at the architect’s recommendation.”~~

OUSD [PTO]: AOR require specified grout. Revise accordingly.

3/1/21: Specifications include cement grouting materials per 09 30 00, section 2.03. We will remove this reference from the qualification. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

09-5000 – ACOUSTICAL CEILINGS

- 42-B. **“We include the replacement of 1st Floor T-bar ceiling grid with seismic attachment.”**

3/24/21: CFJV includes per OUSD's (3/2/21) GMP Allowance Log Comments. [SN]



09-6400 -- FLOORING – CARPET, RESILIENT, WOOD

43. **“We include Forbo Marmoleum Fresco per the FL2 linoleum tile specification noted in the Finish Legend on A1.01. This matches Increment #1 flooring (but not Increments #2, #3 & #4). Note the 3871 Silver Birch color is no longer carried by the manufacturer. Please specify a new color of Marmoleum Fresco linoleum tile to be installed.”**

OUSD [PTO]: AOR to provide new color selection.

3/1/21: Will coordinate color selection. Architect to confirm. [SN]

LCA- Comparable color TBD during submittal process.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

09-9900 -- PAINTING

44. **“We exclude any painting for the HSS columns and canopy in the Library entrance per 1/A2.01, and include the painting of steel plate head and jamb at north entry (Grid Line J). Architect to confirm paint color”**

OUSD [PTO]: The newly installed steel wrapped lintel will need to be painted to match the adjacent one. Please revise accordingly.

3/1/21: Qualification has been revised to reflect painting of steel plate head and jamb at north entry (Grid Line J) is included. Architect to confirm paint color. [SN]

3/3/21: OUSD Agrees.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

09-9900 -- PAINTING

45. **“We do not include Type 3, ADA Decal at Room 101B, and Type 5, ALS at Room 104, signage as they have been installed in a previous increment.”**

OUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

46. **“We do not include Room ID signage at Basement 123 per RFC No. 44.”**

OUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

23-0010 -- HVAC

47. **“The General Mechanical Notes on M0.00 allude to new construction. We include the cleaning and maintenance of the existing HVAC system per the General Notes on M1.01.”**

OUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

48. **“We include diagnostic evaluation of rooftop AHU serving the Library. However, we do not include repair of the rooftop AHU unit since it is unclear if it is required until diagnostic is complete.”**

OUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



49. **“Partial walls in Office 2107 will be removed. However, we assume the locations of ductwork and grilles will not need to be modified. Hence, we do not include.”**

OUUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUUSD and LCA.

50. **“We assume existing insulations at ductwork are in good condition. We do not include any replacement of insulation at ductwork.”**

OUUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUUSD and LCA.

51. **“We assume only ductwork cleaning and new grilles installation work on level 1 only. We do not include any HVAC on any other levels.”**

OUUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUUSD and LCA.

52. **“We assume no temporary air is required during construction.”**

[OUUSD PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUUSD and LCA.

53. **“We do not include demand control ventilation as noted on M0.00. We assume this is a mistake, as the building is served by a rooftop AHU, not by fancoils.”**

OUUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUUSD and LCA.

54. **“We include a \$2,100 allowance for replacing 5% of existing devices per Keynote 18 on M0.00.”**

OUUSD [PTO]: Agreed.

55. **NEW QUAL:** “Since submitting the GMP we have noticed HVAC equipment needs to be removed at 2nd Level West wall, and have included an allowance in the GMP.” [SN]

3/3/21: OUUSD Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUUSD and LCA.

23-0010 – ELECTRICAL AND LOW VOLTAGE

56. **“We do not include any electrical demo work at the Basement or Level 2, as no scope in these areas is shown on ED1.01.”**

OUUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUUSD and LCA.

57. **“We do not include any new electrical installation at Level 2, as no Level 2 electrical plans were provided.”**

OUUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUUSD and LCA.



58. **“We include an allowance of \$2,100 to replace 5% of existing fire alarm devices per General Note 30 on FA0.01.”**

OUUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

59. ~~“We assume installation of new telephone & data outlets are not required, as none are located on E1.01.”~~ **We include data outlets and raceway scope per Addendum 02.”**

OUUSD [PTO]: #4 Incorrect AOR/EOR neglected to add per OUSD request (6) data drops. AOR/EOR to issue addendum #2 to include scope of work. Revise accordingly.

3/1/21: Qual revised to reflect data scope. Addendum 02 received and add cost is being pursued.

[SN]

3/3/21: OUSD Agrees.

3/4/21 AOR Agrees.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

60. **“We assume the existing electrical panels are in good, working condition. We do not include repair or replacement of existing electrical panels.”**

OUUSD [PTO]: Agreed.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

OWNER'S ALLOWANCE

61. 3/3/21 OUSD: Please add one hundred thousand dollars to an owners allowance line for unforeseen conditions. **“ We include a \$100,000 owner’s allowance for unforeseen conditions.”**

3/8/21: CFJV to add a General/Division 1 qualification for \$100,000 GMP allowance for unforeseen conditions. [SN]

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.

EXHIBIT A – DOCUMENT LIST

62. CFJV should confirm that the comments included in Exhibit A will be reflected here. See snapshot below. **“We include a revised Exhibit A – Document List to reflect the most current reports available for Topo Survey (including Calichi civil drawings), HazMat analysis (including Add 01 specs), OUSD data & Comm Specs (Rev. 1/29/2020), and Technical Standards Bulletin (Rev 1/29/2020).”**

3/8/21: CFJV will revise Exhibit A – Document List to reflect most current Topo Survey, HazMat analysis, OUSD Data & Comm specs, and Technical Standards Bulletin.

3/24/21: Review/Accepted by (3/23/21) meeting w/ OUSD and LCA.



INCREMENT #4A Repricing - Qualifications, Assumptions & Exclusions

#3 should be based off of current as built and Calichi civil drawings. Please revise accordingly. PTO 2/19/21

**EXHIBIT A - DOCUMENT LIST
February 18, 2021**

Project Manual (Specifications), Addendum #1 package prepared by LCA Architects, dated January 18, 2021-

Drawings, Addendum #1 package prepared by LCA Architects, dated January 18, 2021-

Geotechnical, Topo, Soil and Hazardous Material Reports

1. Geotechnical Evaluation and Geologic Hazards Assessment Fremont High School, prepared by Ninyo & Moore, dated October 10, 2016.
2. Soil Classification Report, Fremont High School Modernization Project, Increment #2, prepared by Ninyo and Moore, dated July 31, 2018. (FOR REFERENCE – ASSUME SIMILAR SOIL CHARACTERISTICS AT INCREMENTS #3 and #4).
3. Fremont High School Topographic Survey, prepared by SANDIS, dated August 22, 2016.
4. Pre-Demolition Hazardous Materials Survey, prepared by ACC Environmental Consultants, dated March 24, 2017.

PLA / LBU / OUSD MEP Pr

5. HAZ-MAT analysis and work specifications by ACC Environmental Consultants Specifications 020290 and work plan dated January 15, 2021 and Pre-Demolition Hazardous Materials Survey dated March 24, 2017. PTO 2/18/21

5. Project labor Agreement between the District and Signatory Contractors and Subcontractors and the Building and Construction Trades Council of Alameda county, AFL-CIO, and its affiliated Local Union Signatories, prepared by Oakland Unified School District, dated 9/28/16.
6. Working Under the Project Labor Agreement for Oakland Unified School District, prepared by Davillier – Sloan Labor Management Consultants, dated September 28, 2016.
7. Oakland Unified School District Project Labor Agreement Contractor Information Packet, dated April 13, 2018.
8. Local Business Utilization Policy Sheet, prepared by Oakland Unified School District, undated.
9. Local Business Enterprise Policy, effective February 1, 2014.
10. Advertisement and Notification for Annual Pre-qualification (MEP SUBS), prepared by Oakland Unified School District, dated February 24, 2017.
11. Local First-Tier MEP Subcontractors Pre-qualification Questionnaire, 2017
12. Non-Local First-Tier MEP Subcontractors Pre-qualification Questionnaire, 2017

As-Built Drawings

13. As-Built drawings – Increment #1 School Entry – DSA Permit set, prepared by LCA Architects, dated October 17, 2017.
14. As-Built drawings – Fremont High School – Permit Set, prepared by Richard C. Marshall, Chester Bowles Jr, Esherrick Homsey Dodge and Davis Joint Venture Architects, dated January 28, 1976.

OUSD Standards

1. Material Standards – A Summary of OUSD Architectural and Material Standards, prepared by Oakland Unified School District, dated June 30, 2019
2. Fire Alarm System Standards, prepared by Oakland Unified School District Department of Buildings

MASTER BUILDERS SINCE 1911



and Grounds, dated February 28, 2020.

3. Interim Fire Alarm Standards Bulletin 17-01 Carbon Monoxide Devices, prepared by Oakland Unified School District Department of Buildings and Grounds, dated June 20, 2017.
4. Interim Fire Alarm Standards Bulletin 17-02 Bosch Supervising Station Equipment, prepared by Oakland Unified School District Department of Buildings and Grounds, dated June 16, 2017.
5. Interim Fire Alarm Standards Bulletin 17-03 Simplex 4100ES Display, prepared by Oakland Unified School District Department of Buildings and Grounds, dated August 1, 2017.
6. Interim Fire Alarm Standards Bulletin 17-04 Concealed Fire Alarm Device Labels, prepared by Oakland Unified School District Department of Buildings and Grounds, dated August 1, 2017.
7. Interim Fire Alarm Standards Bulletin 17-05 Wall Mounted Notification Appliances, prepared by Oakland Unified School District Dept of Buildings and Grounds, dated September 12, 2017.
8. Intrusion Alarm System Standard, prepared by Oakland Unified School District Department of Buildings and Grounds, dated February 28, 2020.
9. Interim Intrusion Alarm Standards Bulletin 18-01 Intrusion Alarm Contractor Qualification, prepared by Oakland Unified School District Department of Buildings and Grounds, dated June 18, 2018.
10. Interim Intrusion Alarm Standards Bulletin 18-02 Intrusion Alarm Contractor Qualification, prepared by Oakland Unified School District Department of Buildings and Grounds, dated August 27, 2018.
11. Technology Services Data & Communications Specifications for the Oakland Unified School District, prepared by Oakland Unified School District, dated January 29, 2018.
12. Technology Services Standards Update Bulletin 18-01 Minimum Conduit Sizing, Fill Capacity and Underground Conduit Schedule, prepared by Oakland Unified School District Technology Services, dated March 15, 2018.
13. Door Hardware Specification Guideline, prepared by Oakland Unified School District, dated December 2, 2014.
14. Master Elevator Standard, prepared by the Oakland Unified School District, dated August 2, 2017.
15. Security Camera Equipment & Software Standards, 3.0, not dated.

#11 & 12 OUSD Standards latest version supplied to the CFJV version was January 29, 2020 revise accordingly. PTO 2/18/21

End of Qualifications, Assumptions and Exclusions

MASTER BUILDERS SINCE 1911

END OF QUALS#

MASTER BUILDERS SINCE 1911



DIVISION OF FACILITIES PLANNING & MANAGEMENT ROUTING FORM

Project Information

Project Name	Fremont New Construction	Site	302
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Basic Directions

Services cannot be provided until the contract is awarded by the Board or is entered by the Superintendent pursuant to authority delegated by the Board.

Attachment Checklist	<input checked="" type="checkbox"/> Proof of general liability insurance, including certificates and endorsements, if contract is over \$15,000 <input checked="" type="checkbox"/> Workers compensation insurance certification, unless vendor is a sole provider
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Contractor Information

Contractor Name	Cahill/Focon JV	Agency's Contact	Nick Misakian				
OUSD Vendor ID #	000850	Title	Owner				
Street Address	1111 Broadway, Suite 1340	City	Oakland	State	CA	Zip	94607
Telephone	510-250-8501	Policy Expires					
Contractor History	Previously been an OUSD contractor? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Worked as an OUSD employee? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
OUSD Project #	13158						

Term of Original/Amended Contract

Date Work Will Begin (i.e., effective date of contract)	9-27-2017	Date Work Will End By (not more than 5 years from start date; for construction contracts, enter planned completion date)	
		New Date of Contract End (If Any)	12-31-2021

Compensation/Revised Compensation

If New Contract, Total Contract Price (Lump Sum)	\$	If New Contract, Total Contract Price (Not To Exceed)	\$
Pay Rate Per Hour (If Hourly)	\$	If Amendment, Change in Price	\$ 3,568,980.00
Other Expenses		Requisition Number	

Budget Information

If you are planning to multi-fund a contract using LEP funds, please contact the State and Federal Office before completing requisition.

Resource #	Funding Source	Org Key	Object Code	Amount
9650/9594	Fund 21, Measure J	210-9650-0-9594-8500-6271-302-9180-9905-9999-99999	6271	\$3,568,980.00

Approval and Routing (in order of approval steps)

Services cannot be provided before the contract is fully approved and a Purchase Order is issued. Signing this document affirms that to your knowledge services were not provided before a PO was issued.

	Division Head	Phone	510-535-7038	Fax	510-535-7082
1.	Acting Director, Facilities Planning and Management				
	Signature	Date Approved	3-31-2021		
2.	General Counsel, Department of Facilities Planning and Management				
	Signature	Date Approved	4/2/2021		
3.	Deputy Chief, Facilities Planning and Management				
	Signature	Date Approved	3/31/2021		
4.	Chief Financial Officer				
	Signature	Date Approved			
5.	President, Board of Education				
	Signature	Date Approved			