SPECIAL PROVISIONS

FOR

CITY OF SAN LUIS OBISPO

Mission Plaza Enhancements

Specification No. 91439-01

August 2024

PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

919 Palm Street
San Luis Obispo, CA 93401
(805) 781-7200

Mission Plaza Enhancements

Specification No. 91439-01

Approval Date June 20, 2023

ARCHITECT OF RECORD

STRUCTURAL ENGINEER OF RECORD

LANDSCAPE ARCHITECT OF RECORD

CIVIL ENGINEER OF RECORD

MECHANICAL ENGINEER OF RECORD

EXPIRES: 06/30/26
THOMA #20-8170
ELECTRICAL ENGINEER OF RECORD

TABLE OF CONTENTS

NOTICE TO BIDDERS
BID SUBMISSION

Sealed bids will be received by the City of San Luis Obispo at the Public Works Administration Office located at 919 Palm Street, San Luis Obispo California, 93401 until

11:30 a.m. on September 12, 2024

at which time they will be publicly opened and read aloud. Public bid opening may be accessed via Microsoft Teams video conference and conference call. In person attendance will be permitted. Use the following link:

https://teams.microsoft.com/l/meetup-join/19%3ameeting_ZDZkNmNmNTMtMjkyYi00MzMwLWJjZmEtMTlkOWViNmQ4NjVj%40thread.v2/0?context=%7b%22Tid%22%3a%22a78b182d-94e4-4507-a9a9-330dcb148164%22%2c%22Oid%22%3a%2255684c81-fa0a-443f-b6a5-1f55eacc1141%22%7d

or join by phone with this number: (209)645-4165 AND CONFERENCE ID: 423 163 152#

Submit bid in a sealed envelope plainly marked:

MISSION PLAZA ENHANCEMENTS, SPECIFICATION NO. 91439-01

Any bid received after the time and date specified will not be considered and will be returned to the bidder unopened. Bids received by Fax or Email will not be considered.

By submission of bid you agree to comply with all instruction and requirements in this notice and the contract documents.

All bids must be submitted on the Bid Item List form(s) provided and submitted with all other Bid Forms included in these Special Provisions.

Each bid must be accompanied by either a:

1. certified check
2. cashier's check
3. bidder's bond

made payable to the City of San Luis Obispo for an amount equal to ten percent of the bid amount as a guaranty. Guaranty will be forfeited to the City San Luis Obispo if the bidder, to whom the contract is awarded, fails to enter into the contract.

The City of San Luis Obispo reserves the right to accept or reject any or all bids or waive any informality in a bid.

All bids are to be compared based on the City Engineer's estimate of the quantities of work to be done, as shown on the Bid Item List.

Bids will only be accepted from bidders that are licensed in compliance with the provisions of Chapter 9, Division III of Business and Professions Code.

The award of the contract, if awarded, will be to the lowest responsive bid submitted by a responsible contractor whose bid complies with the requirements prescribed. If the contract is awarded, the contract will be awarded within 60 calendar days after the opening of the bids.

Failure to raise defects in the notice to bidders or bid forms prior to bid opening constitute a waiver of those defects.

BID DOCUMENTS

A copy of the plans and special provisions may be downloaded, free of charge, from the City's website at:

www.slocity.org/government/department-directory/public-works/public-works-bids-proposals

No printed copies are available for purchase at the City office.

Standard Specifications and Engineering Standards referenced in the Special Provisions may be downloaded, free of charge, from the City's website at:

www.slocity.org/government/department-directory/public-works/documents-online/construction-documents

You are responsible to obtain all issued addenda prior to bid opening. Addenda will be available to download at the City's website listed above or at the office of the City Engineer.

Contact the project manager, Sandra Golonka at 805-781-7239 or the Public Works Department at (805) 781-7200 prior to bid opening to verify the number of addenda issued.

You are responsible to verify your contact information is correct on the plan holders list located on the City's website at:

www.slocity.org/government/department-directory/public-works/public-works-bids-proposals.

PROJECT INFORMATION

In general, the project consists of demolition of the existing restroom building, trellis structure, and site improvements for the construction of a new restroom and kiosk building with adjacent plaza and patio.

The project estimated construction cost is $2,250,000.

Contract time is established as 180 working days.

The fixed liquidated damages amount is established at $1,725 per day for failure to complete the work within the contract time.

In compliance with section 1773 of the Labor Code, the State of California Department of Industrial Relations has established prevailing hourly wage rates for each type of workman. Current wage rates may be obtained from the Division of Labor at:

https://www.dir.ca.gov/oprl/DPreWageDetermination.htm

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

QUALIFICATIONS

You must possess a valid Class A or Class B Contractor's License at the time of the bid opening.

You and any subcontractors required to pay prevailing wage must be registered with the Department of Industrial Relations pursuant to Section 1725.5 of the Labor Code.

You as the prime contractor or a qualified subcontractor utilized by you must have experience constructing projects similar to the work specified for this project. Provide six separate reference projects completed by you or your qualified subcontractor as described below. All referenced projects must have been completed within the last five years from this project's bid opening date unless otherwise noted below.

Two of the six referenced projects must include construction of a new public building completed by you as the prime contractor or a qualified subcontractor used for this project.

One of the six referenced projects must include brick paving work completed by either you as the prime contractor or a qualified subcontractor used for this project.

One of the six referenced projects must include plasterwork on a historic adobe structure completed by either you as the prime contractor or a qualified subcontractor used for this project within the last years twenty years from this project's bid opening date.

Two of the six reference projects must be for projects completed under contract with a city, county, state or federal government agency as the prime contractor for a project involving some work similar to this project.

Failure to provide reference projects as specified in this section and as required on the qualification form is cause to reject a bid as being non-responsive.

The City reserves the right to reject any bid based on non-responsiveness if a bidder fails to provide a bid that complies with all bidding instructions.

The City reserves the right to reject a responsive bid based on the non-responsibility of the bidder if the Director of Public Works or Designee finds, after providing notice and a hearing to the bidder, that the bidder lacks the

1. knowledge
2. experience,
3. or is otherwise not responsible as defined in Section 3.24 of the San Luis Obispo Municipal Code to complete the project in the best interest of the City.

Rejected bidders may appeal this determination. Appeal must comply with the requirements in this Notice to Bidders.

It is the City of San Luis Obispo's intent to award the contract to the lowest responsive bid submitted by a responsible bidder. If in the bidder's opinion the contract has been or may be improperly awarded, the bidder may protest the contract award.

Protests must be filed no later than five working days after either:

1. Bid opening date
2. Notification of rejected bid.

Protest must be in writing and received by the project manager located at:

919 Palm Street
San Luis Obispo, CA 93401.

Valid protests must contain the following information:

1. The reasons for the protest
2. Any supporting documentation
3. The ruling expected by the City to remedy the protest.

Any protest not containing all required information will be deemed invalid and rejected.

The City will consider additional documentation or other supporting information regarding the protest if submitted in compliance to the specified time limits. Anything submitted after the specified time limit will be rejected and not be considered.

The Director of Public Works or Designee may request additional information to be submitted within three days of the request, unless otherwise specified, and will notify the protester of ruling within ten days of determination.

If the protester is not satisfied with ruling, the protester may appeal the ruling to the City Council in compliance with Chapter 1.20 of the City of San Luis Obispo Municipal Code.

Pursuant to the Public Records Act (Government Code, § 6250, et seq.), the City will make public records available upon request.

AWARD

The lowest bidder will be determined in compliance with Public Contract Code Section 20103.8(c) with the Publicly Disclosed Funding Amount of $2,400,000 using the TOTAL PROJECT BID.

As a condition to executing a contract with the City, two bonds each equal to one hundred percent of the total contract price are required in compliance with Section 3-1.05 of the Standard Specifications.

You may substitute securities for moneys withheld under the contract in compliance with the provisions of the Public Contract Code, Section 10263.

ACCOMMODATION

If any accommodations are needed to participate in the bid process, please contact Allie Gernard at (805) 781-7200 or by Telecommunications Device for the Deaf at (805) 781-7107. Requests should be made as early as possible in the bidding process to allow time for accommodation.

BID FORMS

All bid forms must be completed and submitted with your bid. Failure to submit these forms and required bid bond is cause to reject the bid as nonresponsive. Staple all bid forms together.

THE UNDERSIGNED, agrees that they have carefully examined:

1. the location of the proposed work
2. the plans and specifications
3. read the accompanying instructions to bidders

and propose to furnish all:

4. materials
5. labor

to complete all the required work satisfactorily in compliance with

6. plans
7. specifications
8. special provisions

for the prices set forth in the bid item list:

BID ITEM LIST FOR
MISSION PLAZA ENHANCEMENTS, SPECIFICATION NO. 91439-01

Item No.	SS(1)	Item Description	Unit of Measure	Estimated Quantity	Item Price (in figures)	Total (in figures)
1	8, 12	TRAFFIC AND PEDESTRIAN CONTROL	LS	1	---	
2	13	WATER POLLUTION CONTROL	LS	1	---	
3	13	STREET SWEEPING	LS	1	---	
4 (S)	15, 39, 73	DEMOLITION OF EXISTING IMPROVEMENTS	LS	1	---	
5	14	HAZARDOUS MATERIALS ABATEMENT IN COMPLIANCE WITH OSHA	LS	1	---	
6	15, 20	CLEAR AND GRUB	LS	1	---	
7	20	TREE REMOVAL	EA	4		
8	5	CONSTRUCTION SURVEYING	LS	1	---	
9	5, 7	CONSTRUCTION FENCING	LS	1	---	
10	77	POTHOLE EXISTING UTILITIES	EA	20		
11	3, 5, 7	OSHA COMPLIANCE FOR TRENCHING	LS	1	---	
12	16	TEMPORARY POWER	LS	1	---	
13	7	SECURITY AND PATHWAY LIGHTING DURING NON-WORKING HOURS	LS	1	---	

Item No.	SS(1)	Item Description	Unit of Measure	Estimated Quantity	Item Price (in figures)	Total (in figures)
14	16, 20	TEMPORARY IRRIGATION AND CONTROLLER	LS	1	---	
15 (S)	19	ROUGH GRADING CUT	CY (F)	80		
16 (S)	19	ROUGH GRADING FILL	CY (F)	70		
17 (S)	19	PRECISE GRADING	SQFT	6700		
18	20	TREE PROTECTION MEASURES	LS	1	---	
19	20	RELOCATE OLIVE TREE	LS	1	---	
20	73	CONCRETE CURB AND GUTTER	LF	70		
21	19, 39, 40, 77	STREET PAVING	SQFT	550		
22	84	CURB PAINT	LF	70		
23	84	4” WHITE TRAFFIC STRIPE	LF	215		
24	82	RELOCATE STREET SIGN	EA	1		
25	64, 77	4" PVC STORM DRAIN	LF	85		
26	68, 77	4” PERFORATED PVC STORM DRAIN	LF	90		
27	77	12” SQUARE CATCH BASIN AND GRATE	EA	4		
28	77	POP UP EMITTER WITH RIPRAP	EA	2		
29	70, 77	TRENCH DRAIN	LF	6		
30	20, 70, 77	TRENCH DRAIN GRATE COVER	LF	6		
31	77	2” WATER SERVICE	EA	1		
32	77	2” BACKFLOW PREVENTION DEVICE	EA	1		
33	77	4” PVC SEWER LATERAL	LF	50		
34	77	SEWER CLEANOUTS	EA	2		
35	20	DECORATIVE UTLITY LID COVER	EA	17		
36 (S)	99	BRICK UNIT PAVING	SQFT	3330		
37 (S)	99	BRICK UNIT PAVING – PERMEABLE SECTION	SQFT	310		
38 (S)	20	GRANITECRETE PAVING	SQFT	960		
39 (S)	99	BRICK EDGE BAND	LF	610		
40 (S)	99	BRICK EDGE BAND AT PERMEABLE BRICK	LF	40		
41	20	MOW CURB	LF	82		

Item No.	SS(1)	Item Description	Unit of Measure	Estimated Quantity	Item Price (in figures)	Total (in figures)
42 (S)	99	GRANITE PLANTER CURB	LF	72		
43 (S)	99	BRICK STEPS	SQFT	70		
44 (S)	73	CONCRETE RETAINING CURB	LF	60		
45 (S)	99	BRICK SEATWALL	LF	66		
46 (S)	99	STONE SEATWALL	LF	28		
47 (S)	20	BENCH	EA	2		
48	20	TRIPLE STREAM WASTE RECEPTACLE	EA	2		
49	20	PLANTER POT A	EA	2		
50	20	PLANTER POT B	EA	1		
51	20	BIKE RACK	EA	1		
52	20	DRINKING FOUNTAIN & ASSOCIATED UNDER-GROUND PLUMBING LINES	EA	1		
53	20	BRONZE PLAQUE	EA	1		
54 (S)	20	PLANTING – SHRUB AREA	SQFT	1740		
55 (S)	20	PLANTING – GRASS SOD	SQFT	750		
56	20	TREES – 24” BOX	EA	1		
57	20	TREES – 48” BOX	EA	2		
58	20	TREE – 60” BOX	EA	1		
59	20	TREE – 96” BOX	EA	4		
60 (S)	20	IRRIGATION SYSTEM	LS	1	---	
61	20	ROOT BARRIER	LF	124		
62	20	INSTALL SOIL AND PLANTS IN FENCED PLANTING AREA	EA	2		
63	99	DECORATIVE PICKET FENCE	LF	80		
64	99	PLANTER FENCE	LF	32		
65	99	STAIR HANDRAIL	LF	20		
66	99	BAR COUNTER	LF	34		
67	77	MISSION STYLE RAILING	LS	1	---	
68	20	STRING LIGHT POST, CABLE, AND FOUNDATION	EA	5		
69	20	LANDSCAPE BOULDER	EA	17		

Item No.	SS(1)	Item Description	Unit of Measure	Estimated Quantity	Item Price (in figures)	Total (in figures)
70	20	1 YEAR PLANT ESTABLISHMENT AND MAINTENANCE PERIOD	LS	1	---	
71 (S)	99	RESTROOM BUILDING	LS	1	---	
72 (S)	99	KIOSK BUILDING	LS	1	---	
73	99	PRIVACY SCREENS AND TRASH ENCLOURE	LS	1	---	
74 (S)	99	ELECTRICAL AND COMMUNICATION IMPROVEMENTS	LS	1	---	
75 (S)	99	PERMANENT ELECTRICAL SERVICE AND METERS	LS	1	---	
76	99	TEMPORARY SERVICE COORDINATION WITH PG&E	LS	1	---	
77	99	ELECTRONIC ART KIOSK DIRECTORY	LS	1	---	
78	99	DECORATIVE LIGHT POLE, FOUNDATION AND LUMINARE	LS	1	---	
79	99	SECURITY CAMERA POLE AND FOUNDATION	EA	2		
80	99	COMPLIANCE WITH ARCHEOLOGICAL MONITORING PLAN	LS	1	---	
81	99	ADOBE PRESERVATION	LS	1	---	
82	99	PERMANENT SERVICE COORDINATION WITH PG&E	LS	1	---	
83	99	COMPLIANCE WITH BUILDING PERMIT REQUIREMENTS	LS	1	---	
84	5	STAGING AREA RESTORATION	LS	1	---	
85	99	PULL FIBER THROUGH EXISTING CONDUIT	LF	1200		
					Bid Total	
Company Name:						

(1) refers to section in the Standard Specifications, with modifications in the Special Provisions, that describe required work.

(S) Specialty item per Section 5-1.13A SUBCONTRACTING, General of the Standard Specifications.

(F) final pay item per Section 9-1.02A

LIST OF SUBCONTRACTORS

Pursuant to Section 4100 of the Public Contracts Code and section 2-1.33C of the standard specifications, the Bidder is required to furnish the following information for each Subcontractor performing more than 1/2 percent (0.5%) of the total base bid. Do not list alternative subcontractors for the same work.

For Streets & Highways projects, subcontractors performing less than ten thousand dollars ($10,000) worth of work need not be mentioned. **Subcontractors required to pay prevailing wage, must be registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 to be listed.**

NOTE: If there are no subcontractors, write "NONE" and submit with bid.

Name Under Which Subcontractor is Licensed	License Number	**DIR Public Works Registration Number**	Address and Phone Number of Office, Mill or Shop	Specific Description of Subcontract	% of Total Base Bid

Attach additional sheets as needed.

PUBLIC CONTRACT CODE SECTION 10285.1 STATEMENT

In compliance with Public Contract Code Section 10285.1 (Chapter 376, Stats. 1985), the bidder hereby declares under penalty of perjury under the laws of the State of California that the bidder, or any subcontractor to be engaged by the bidder, **has ____, has not ____** been convicted within the preceding three years of any offenses referred to in that section, including any charge of fraud, bribery, collusion, conspiracy, or any other act in violation of any state or federal antitrust law in connection with the bidding upon, award of, or performance of, any public works contract, as defined in Public Contract Code Section 1101, with any public entity, as defined in Public Contract Code Section 1100, including the Regents of the University of California or the Trustees of the California State University. The term "bidder" is understood to include any partner, member, officer, director, responsible managing officer, or responsible managing employee thereof, as referred to in Section 10285.1.

NOTE: The bidder must place a check mark after "has" or "has not" in one of the blank spaces provided. The above Statement is part of the Bid. Signing this Bid on the signature portion constitute signature of this Statement. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

PUBLIC CONTRACT CODE SECTION 10162 QUESTIONNAIRE

In compliance with Public Contract Code Section 10162, the Bidder must complete, under penalty of perjury, the following questionnaire:

Has the bidder, any officer of the bidder, or any employee of the bidder who has a proprietary interest in the bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state, or local government project because of a violation of law or a safety regulation?

_____ Yes _____ No

If the answer is yes, attach a letter explaining the circumstances

PUBLIC CONTRACT CODE SECTION 10232 STATEMENT

In compliance with Public Contract Code Section 10232, you hereby state under penalty of perjury, that no more than one final unappealable finding of contempt of court by a federal court has been issued against you within the immediately preceding two-year period because of your failure to comply with an order of a federal court which orders you to comply with an order of the National Labor Relations Board.

LABOR CODE SECTION 1725.5 STATEMENTS

The bidder has delinquent liability to an employee or the state for any assessment of back wages or related damages, interest, fines, or penalties pursuant to any final judgment, order, or determination by a court or any federal, state, or local administrative agency, including a confirmed arbitration award. Any judgment, order, or determination

that is under appeal is excluded, provided that the contractor has secured the payment of any amount eventually found due through a bond or other appropriate means.

_____ Yes _____ No

The bidder is currently debarred under Section 1777.1 or under any other federal or state law providing for the debarment of contractors from public works.

_____ Yes _____ No

NOTE: The above Statements and Questionnaire are part of the Bid. Signing this Bid on the signature portion constitute signature of this Statement and Questionnaire. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

NON-COLLUSION DECLARATION

I, _____, declare that I am _____ of _____, the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone refrained from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Executed on _____, 20_____, in _____

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

_____

(Signature and Title of Declarant)

(SEAL)

Subscribed and sworn to before me
this _____day of _____, 20_____

_____

Notary Public

Company Name:_____

BIDDER ACKNOWLEDGEMENTS

By signing below, the bidder acknowledges and confirms that this bid is based on the information contained in all contract documents, including the notice to bidders, plans, specifications, special provisions, and addendum number(s) _____. **(Note: You are responsible to verify the number of addenda prior to the bid opening.)**

The undersigned further agrees that in case of default in executing the required contract, with necessary bonds, within eight days, (not including Saturdays, Sundays, and legal holidays), after having received a mailed notice that the contract is ready for signature, the proceeds of the check or bond accompanying his bid will become the property of the City of San Luis Obispo.

Licensed in accordance with an act providing for the registration of contractors, License No._____, Expiration Date _____.

The above statement is made under penalty of perjury, and any bid not containing this information "will be considered non-responsive and will be rejected" by the City.

Signature of Bidder _____

_____
(Print Name and Title of Bidder)

DIR– Public Works Registration No: _____

Business Name (DBA): _____

Owner/Legal Name: _____

Indicate One: ☐Sole-proprietor ☐ Partnership ☐Corporation

List Partners/Corporate Officers: _____
Name Title

_____
Name Title

_____
Name Title

Business Address _____

Street Address _____

Mailing Address _____

City, State, Zip Code _____

Phone Number _____

Fax Number _____

Email Address _____

Date _____

QUALIFICATIONS

Failure to furnish complete reference information **ON THIS FORM**, as specified in this project's Notice to Bidders and indicated below, is cause to reject the bid. Additional information may be attached but is not a substitute for this form.

Reference Number 1

Name of Prime Contractor or Subcontractor Used for this Reference Project:	
Customer Name & Contact Individual:	
Telephone & Email:	
Project Name (Site Address):	
Did this project include new public building construction? Yes □ No □	Describe the services provided and how this project is similar to that which is being bid:
Was this contract for a public agency? Yes □ No □	
Is this reference project from work complete as the prime contractor for the project? Yes □ No □	Date project completed:

Reference Number 2

Name of Prime Contractor or Subcontractor Used for this Reference Project:	
Customer Name & Contact Individual:	
Telephone & Email:	
Project Name (Site Address):	
Did this project include new public building construction? Yes □ No □	Describe the services provided and how this project is similar to that which is being bid:
Was this contract for a public agency? Yes □ No □	
Is this reference project from work complete as the prime contractor for the project? Yes □ No □	Date project completed:

Reference Number 3

Name of Prime Contractor or Subcontractor Used for this Reference Project:	
Customer Name & Contact Individual:	
Telephone & Email:	
Project Name (Site Address):	
Did this project include brick paving work? Yes □ No □	Describe the services provided and how this project is similar to that which is being bid:
Was this contract for a public agency? Yes □ No □	
Is this reference project from work complete as the prime contractor for the project? Yes □ No □	Date project completed:

Reference Number 4

Name of Prime Contractor or Subcontractor Used for this Reference Project:	
Customer Name & Contact Individual:	
Telephone & Email:	
Project Name (Site Address):	
Did this project include plasterwork on a historic adobe structure? Yes □ No □	Describe the services provided and how this project is similar to that which is being bid:
Was this contract for a public agency? Yes □ No □	
Is this reference project from work complete as the prime contractor for the project? Yes □ No □	Date project completed:

Reference Number 5

Name of Prime Contractor or Subcontractor Used for this Reference Project:	
Customer Name & Contact Individual:	
Telephone & Email:	
Project Name (Site Address):	
Does this reference include some work similar to the project being bid? Yes □ No □	Describe the services provided and how this project is similar to that which is being bid:
Was this contract for a public agency? Yes □ No □	
Is this reference project from work complete as the prime contractor for the project? Yes □ No □	Date project completed:

Reference Number 6

Name of Prime Contractor or Subcontractor Used for this Reference Project:	
Customer Name & Contact Individual:	
Telephone & Email:	
Project Name (Site Address):	
Does this reference include some work similar to the project being bid? Yes □ No □	Describe the services provided and how this project is similar to that which is being bid:
Was this contract for a public agency? Yes □ No □	
Is this reference project from work complete as the prime contractor for the project? Yes □ No □	Date project completed:

ATTACH BIDDER'S BOND TO ACCOMPANY BID

Know all men by these presents:

That we _____, AS PRINCIPAL, and

_____, AS SURETY, are held and firmly bound unto the City of San Luis Obispo in the sum of:

_____ Dollars (_____) to be paid to said City or its certain attorney, its successors and assigns; for which payment, well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors or assigns, jointly and severally, firmly by these presents:

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the certain bid of the above

bounden _____

to construct _____
(insert name of street and limits to be improved or project)

dated _____ is accepted by the City of San Luis Obispo, and if the above

bounden _____, his heirs, executors, administrators, successors, and assigns shall duly enter into and execute a contract for such construction and shall execute and deliver the two bonds described within ten (10) days (not including Saturdays, Sundays, or legal holidays) after the above bounden,

_____, has received notice by and from the said City of San Luis Obispo that said contract is ready for execution, then this obligation shall become null and void; otherwise, it shall be and remain in full force and virtue.

IN WITNESS WHEREOF, we hereunto set our hands and seals this ___ day of _____, 20____.

Bidder Principal:

_____

Signature Date
Title:

Surety:

_____

_____

_____

Bidder's signature is not required to be notarized. Surety's signature must be notarized.
Equivalent form may be substituted
(Rev. 6-30-14)

SPECIAL PROVISIONS
ORGANIZATION

Special provisions are under headings that correspond with the main section heading of the Standard Specifications. Each special provision begins with a revision clause that describes or introduces a revision to the Standard Specifications. Any paragraph added or deleted by a revision clause does not change the paragraph number of the Standard Specifications for any other reference to a paragraph of the Standard Specifications.

DIVISION I GENERAL PROVISIONS
1 GENERAL

Add to Section 1-1.01 GENERAL:

The work must be done in compliance with the City of San Luis Obispo, Department of Public Works:

1. Mission Plaza Enhancements - Special Provisions
2. City of San Luis Obispo Standard Specifications and Engineering Standards – 2020 edition
3. State of California, Department of Transportation Standard Specifications and Standard Plans – 2015 edition

In case of conflict between documents, governing ranking must comply with section 5-1.02 of the City of San Luis Obispo's Standard Specifications. All work must conform to these Special Provisions and appendices, project plans, and the most current Building Codes. In the event of a conflict, the more stringent requirement shall apply.

Failure to comply with the provisions of these sections is a material breach of contract:

1. Sections 5 through 8 of the Standard Specifications
2. Section 12 through 15 of the Standard Specifications
3. Section 77-1 of the Standard Specifications
4. Section 81 of the Standard Specifications
5. authorized working hours
6. OSHA compliance

3 CONTRACT AWARD AND EXECUTION

Add Section 3-1.18B CONTRACT EXECUTION, Building Permit:

3-1.18B Building Permit

The contractor must obtain a no-fee building permit from the Community Development Department. All requirements of the building permit shall be applied to the project. The contractor is responsible for coordinating inspection with the building division for the project. Request for inspection must be scheduled 72 hours in advance of the required inspection.

4 SCOPE OF WORK

Add to Section 4-1.03 WORK DESCRIPTION:

Comply with the provisions of Sections 3, 5, 6, 7, 8, 12, 13, 14, 15, 16, 19, 20, 37, 39, 40, 56, 64, 68, 70, 73, 77, 82, 84, 86, 90, and 99 for general, material, construction, and payment specifics. Refer to these Special Provisions including Appendix B Supplemental Technical Specifications for modifications to the above Sections.

5 CONTROL OF WORK

Add to Section 5-1.01 GENERAL:

Work hours are restricted to 7:00 a.m. to 4:00 p.m Monday through Friday with noise restricted quiet hours from 11:00 a.m. to 1:00 p.m. Quiet hours prohibits use of pneumatic equipment, sawcutting or jackhammer use, but work shall otherwise continue.

Work on and near the Adobe must be completed in consecutive working days. Commenced work should proceed without interruption until completed. Unless instructed by the Historical Monitor or Engineer. Notice to commence work in this area must given 5 days before intended start date in order for City staff to notify the Historical Monitor.

Replace 5th paragraph in Section 5-1.13A SUBCONTRACTING, General with:

You must perform work equaling at least 25 percent of the value of the original total bid with your:

1. Employees
2. Equipment
3. Rental equipment with operator
4. Rental equipment without operators

Excluding items designated with an “S” on the Bid Item List. “S” indicates specialty items of work. The value of specialty items of work is not included in the calculation.

A representative of the prime contractor must be on site when any subconsultant is performing contract work. Contract work will not be allowed to continue until prime contractor’s representative is on site.

Contractor shall provide a sequencing plan for the tie over for electrical from permanent to temporary service. The sequencing plan must be approved prior to work. Electrical service shall be provided to the plaza lighting at the end of each day.

The Contractor shall maintain a clean set of drawings and document weekly any changes to the project construction, document the location and depth of any existing utility or irrigation lines that are exposed, and the location of water and sewer lines under the buildings. The record drawings shall be submitted as a part of project closeout.

Add to Section 5-1.23A SUBMITTALS, General:

All critical submittals or items with long lead times shall be submitted within 3 weeks of the award of contract. All submittals and shop drawings shall be received within 6 weeks of award of contract. Late submittals may be allowed if the contractor can show the delivery of those items will not delay the completion of the project. When more than 4 submittals are submitted at one time the contractor shall prioritize the review process. The contractor will be allowed to start work when all critical submittals have been approved and the contractor can show that the delivery time of those items will not interrupt continuous work and that the project will be completed within the allowable working days. Attention to the start date should be given to avoid working on items that could be slowed during wet weather. The contractor shall give the city a two week notice before starting work. The contractor must start work within three weeks of approval of all critical submittals and proof of continuous work schedule.

Add Section 5-1.27A RECORDS with:

The Contractor must provide a digitally red-lined PDF version of the project that includes red line changes or revisions to plans and specifications at the completion of construction. Scans of the field record set will not be accepted. Release of retention and final payments will be held until the digital version of red line markups of the plans and specifications are provided for review and approved by the Engineer.

Replace Section 5-1.32 AREAS FOR USE with:

Contractor shall be allowed area for parking, staging, and construction in accordance with Appendix J: Construction Staging Plan. You are allowed to use three parking spaces along Broad Street for vehicle parking during work hours. Contractor Staging and work area must be fenced and secured as specified in Section 7-1.04 Public Safety of these Special Provisions.

Contractor shall maintain an approximate 18' clear path of travel within existing hardscape through the plaza between the mission and the worksite to allow for vehicle access to the plaza and parking lot across the creek via the Warden Bridge. Construction fencing posts and support legs shall not encroach into the clear path of travel.

The Contractor shall maximize pedestrian and vehicular egress along Monterey Street and the project frontage.

The Contractor shall maintain a safe pedestrian path of travel from Monterey Street through the plaza throughout construction of the project. The contractor shall select from options A or B when implementing the pedestrian path of travel: reference Appendix J: Construction Staging Plan. Redirecting pedestrians to Monterey and Broad crosswalk is not an option. Implementation and maintenance of the required pedestrian path of travel from Monterey Street to the plaza shall be included in the payment for Traffic and Pedestrian Control. Any modification to the striping on Monterey Street shall be restored to it original conditions and included in the price of Traffic and Pedestrian Control.

The Contractor shall restore or replace all areas of use for staging to its original condition.

7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

Add to Section 7-1.03B PUBLIC CONVENIENCE, Traffic Control Plan:

Work hours are Monday through Friday between 7:00 a.m. to 4:00 p.m.

Contractor shall provide traffic control plan and traffic control application at or before the preconstruction meeting. Traffic control plan must be drawn to scale. Contractor shall coordinate with the city when required during construction to provide modified traffic control for special public events, including but not limited to, holiday, music, and cultural celebrations and associated set up and tear down times. Traffic control application may be obtained on the City's website:

www.slocity.org/government/department-directory/public-works/documents-online/construction-documents

Upon approval of the traffic control plan, the City will issue a no-fee Encroachment Permit. Permittee is responsible to comply with all conditions of the traffic control plan. Complete work using due diligence to restore free flowing of traffic.

Add to Section 7-1.04 PUBLIC SAFETY:

You must provide a rigid 6' minimum high chain link or other rigid work site fence around any exterior storage and staging areas and provide other such safeguards and facilities to keep Mission Plaza users from entering the construction area. The City will supply fence screening materials for installation by the Contractor. The Contractor is responsible to maintain the fence screening throughout the duration of the project. You must control and maintain Mission Plaza access and vehicular traffic in a safe manner around the work site at all times. You must leave the work site clean and free from hazards at the end of each day and on weekends. Walkways must be swept daily. All tools, forms, stakes, hardware, paint cans, building materials and/or any other items that could be a potential hazard to the public and Plaza users must be removed from the work site at the end of each day. Coordinate work-site fence with staging area as specified in Section 5-1.32, "Areas of Use," of the Special Provisions. Contractor to provide security lighting for secure construction area during non-daylight, non-working hours and pathway lighting along fence adjacent to pedestrian path of travel for the duration of the project to the satisfaction of the Engineer.

8 PROSECUTION AND PROGRESS

Replace the 1st paragraph in Section 8-1.02A SCHEDULE, General with:

Provide a Level 2 Critical Path Method schedule for this work. A one week look ahead schedule shall be provided to the Engineer before commencing the following week's work. This requirement shall be completed in order to continue construction work.

Add to Section 8-1.03 PRECONSTRUCTION CONFERENCE:

14. Schedule of Values for all lump sum bid items.

9 PAYMENT

Add to Section 9-1.01 GENERAL:

Work as specified in these specifications and as shown on the Plans for which no separate payment is provided for in the Bid Item List will be considered a subsidiary obligation of the Contractor and the cost thereof shall be included in the applicable Contract prices for the item to which the work applies.

The following additional Bid Item descriptions are included for those atypical bid items not fully covered in the Standard Specifications:

BID ITEM 4 – DEMOLISION OF EXISTING IMPROVEMENTS - Payment for this lump sum bid item shall be made on a percentage basis based on the lump sum amount of the bid item. Work shall include removal of all items shown on the plans to be demolished, removed or replaced but not limited to existing restrooms, footings, concrete, walls, curbs, fences and footings, electrical systems, light poles and footings, landscaping, and irrigation. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

BID ITEM 6 – CLEAR AND GRUB - Payment for this lump sum bid item shall be made on a percent complete basis, based on lump sum amount for this item, and includes full compensation for removal of all vegetation, including but not limited to roots, soil, logs, brush, stumps, and debris. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

BID ITEM 9 – CONSTRUCTION FENCING - Payment for this lump sum bid item shall be made on a percent complete basis, based on lump sum amount for this item, and includes full compensation for installation and maintenance of temporary fencing for the entire project. Contractor shall install and maintain a City provided custom screening throughout the project. Fence footing must not create a tripping hazard within pedestrian or vehicular pathway. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

BID ITEM 12 – TEMPORARY POWER - Payment for this lump sum bid item shall be made on a percent complete basis, based on lump sum amount for this item, and includes full compensation for sequencing plan, installation of temporary power service, cutover, and maintenance of the temporary service during construction. The temporary power service shall include but not limited to conduits, pull boxes and connecting all circuits need to operate the plaza lighting systems, cameras and receptacles during the duration of construction. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

BID ITEM 14 – TEMPORARY IRRIGATION AND CONTROLLER - Payment for this lump sum bid item shall be made on a percent complete basis, based on lump sum amount for this item, and includes full compensation for temporary irrigation to plants and trees during construction. The temporary controller and irrigation system shall be maintained in a full operating condition to ensure survival of the existing plantings Contractor shall submit a plan on how temporary irrigation will be provided. Plan must include electrical requirements for temporary controller. Temporary controller needs to be protected from rain and vandalism throughout the project and located in an area accessible to City maintenance staff. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

BID ITEM 60 – IRRIGATION SYSTEM - Payment for this lump sum bid item shall be made on a percent complete basis, based on lump sum amount for this item, and includes full compensation for a complete permanent irrigation system to plants and trees and lawn. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work as shown on the plans and called for in the special provisions.

BID ITEM 62 – INSTALL SOIL/ PLANTS IN FENCED PLANTING AREA - Measurement and payment for installation of soil and plants for planters adjacent to the granitecrete seating area will be made at the unit price bid per each in accordance with the Contract Documents including but not limited to all the necessary labor, tools, materials, and equipment as shown on the plans and called for in the special provisions and required to do all the work.

BID ITEM 67 – MISSION STYLE RAILING – Payment for this lump sum bid item shall be made on a percent complete basis, based on the lump sum amount for this item, and includes full compensation for a complete installation of mission style footings, posts, approximately 72’ of railing, and burying exposed conduit. Any existing exposed conduit must be buried as part of work completed per city standards. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

BID ITEM 79 – SECURITY CAMERA POLE AND FOUNDATION - Payment for this lump sum bid item shall be made on a percent complete basis, based on lump sum amount for this item, and includes full compensation for a complete installation of foundation, camera poles, and installation of city provided camera. Camera must be fully functional to be considered complete. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

BID ITEM 81 – ADOBE PRESERVATION - Payment for this lump sum bid item shall be made on a percent complete basis, based on lump sum amount for this item, and includes full compensation for a complete installation of plaster walls, window frame, insert, and surrounding drainage. All work shall comply with recommendations listed in Appendix D – Murray Adobe Recommendations and plan sheet A-911. Adobe work shall comply with the approved historical monitoring plan and monitored by a city provided historic architectural consultant. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

BID ITEM 84 – STAGING AREA RESTORATION - Payment for this lump sum bid item shall be made on a percent complete basis, based on lump sum amount for this item, and includes full compensation for a complete repair or replace of damaged sod, concrete, asphalt, including but not limited to other materials within areas used for staging. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

BID ITEM 85 – PULL FIBER THROUGH EXISTING CONDUIT - Measurement and payment for pulling 1200 linear feet of fiber through existing conduit will be paid by linear feet. Fiber pull will begin at 879 Morro and continue to Palm. From Palm extend fiber pull to Broad. From Palm and Broad pull fiber to manhole within project limits at Broad and Monterey. This bid item shall include all the necessary labor, tools, materials, and equipment required to do all the work.

Add to Section 9-1.02A MEASUREMENT, General:

Contractor must submit a Schedule of Values for all lump sum bid items of work at the Preconstruction Meeting in compliance with Section 9-1.16B. Payment application pay items shall match the bid item sheet and subcategories to a pay item will not be allowed. Payment for Lump Sum items will be based on the percentage of acceptable work and the schedule of values for that item.

Add to Section 9-1.03 PAYMENT SCOPE:

Any item of work that does not have separate bid item is considered included in the project cost of work and no additional compensation will be paid.

DIVISION II GENERAL CONSTRUCTION

13 WATER POLLUTION CONTROL

Add to Section 13-7.02C STREET SWEEPING, Construction:

The Contractor must submit a street sweeping schedule for approval by the Engineer in compliance with the erosion control plan and Caltrans Section 13. Provide stabilized construction entrance per erosion control plan and remove all mud and other debris to the satisfaction of the City Engineer. Street sweeping must be done in a manner that street parking is available within 600 ft from affected addresses, unless approved by the Engineer.

Add to Section 13-7.02D Payment, STREET SWEEPING, Payment:

The lump sum item price for Street Sweeping shall include full compensation for furnishing all labor, materials, tools, equipment, personnel, “No Parking” notices, door hangers, and incidentals, and for doing all the work involved with Street Sweeping and no additional compensation therefor.

14 ENVIRONMENTAL STEWARDSHIP

Add to Section 14-2.03A ARCHAEOLOGICAL RESOURCES, General:

The Contractor shall comply with all requirements listed in Appendix E – Archeological Monitoring Plan. The City will hire an archeological monitor to inspect all ground disturbing activities.

Add to Section 14-2.04 HISTORIC STRUCTURES:

The Contractor shall comply with all recommendations listed in Appendix D – Murray Adobe Recommendations.

Add to Section 14-11.01 HAZARDOUS WASTE AND CONTAMINATION, GENERAL:

The Contractor shall comply with all requirements listed in Appendix H – Lead Testing Report. Contractor shall refer to Appendix G – Asbestos Testing Report for current conditions of existing restroom building.

15 EXISTING FACILITIES

Add Section 15-2.01 PAVEMENT REMOVAL:

The outline of the asphalt concrete pavement area to be removed must be cut on a neat line with a power driven diamond saw to a minimum depth of the existing asphalt concrete before removing all existing asphalt. As an alternative, the Contractor may use a grinding device such as a “zipper” to remove the AC patch area. All areas of removal must be cut as marked in the field and must be uniform in pattern (square, rectangle) and reviewed by the Engineer prior to removal.

Paving is not to be done without the inspection of the Engineer.

A mechanical tamp is to be used for compacting the base or subgrade and bottom lifts of the AC. A roller is to be used for the top lift of AC. Vibrating Plates are not allowed.

Additional AC patch repair areas and extents may be identified by the Engineer. Pavement repair locations must be field verified by the Engineer before the start of work. Pavement restoration must comply with Section 19, 39, and 77.

Add Section 15-3.01 ADOBE PROTECTION:

A qualified contractor with demonstrated experience working with Adobe structures shall be used for all work adjacent to and on the Murray Adobe.

Refer to Appendix D: Murray Adobe Recommendations for additional information.

DIVISION III EARTHWORK AND LANDSCAPE

20 LANDSCAPE AND IRRIGATION

Add to Section 20-1.01D(1) GENERAL, Quality Assurance - General:

1. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years documented experience.

2. Installer Qualifications: Company specializing in installing and planting the plants with five years experience.

3. Testing Laboratory: Recognized laboratory for soil and plant disease analysis for ornamental horticulture, approved by the Inspector. Testing laboratory is to perform all work in accordance with the current methods of the Association of Official Agricultural Chemists.

Replace Section 20-1.02A MATERIALS, General with:

FINE COMPOST

1. Compost for soil amendment and preparation to be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials. Compost to have a dark brown color and a soil like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120f) upon delivery or rewetting is not acceptable.
2. Compost facility and compost material must meet the following requirements:
3. Inspected and regulated by the local enforcement agency for CalRecycle. The past 3 inspection reports to be submitted verifying compliance with title14 requirements of the process to further reduce pathogens (pfrp), fecal coliform and salmonella testing and pathogen and epa, 40 cfr 503 regulations.
4. Certified through the uscc seal of testing assurance (sta) program (a compost testing and information disclosure program).
5. Analyzed by a laboratory that is enrolled in the us composting council's compost analysis proficiency (cap) program and using approved test methods for the evaluation of composting and compost (tmecc).
6. Facility must provide proof of compost testing within 120 calendar days prior to delivery of material to project site.

Apply a four-inch lift of compost during cultivation.

Add to Section 20-1.02E Fertilizer:

AMENDMENTS AND MYCORRHIZAL FUNGI INOCULANT

Apply the following product to all new planting holes:

- Granular Tri-c myco Revival Plus applied at the manufacturer's recommended rates based on plant material container size.

Add to Section 20-1.03A CONSTRUCTION, General:

TEST REPORTS

1. Soil tests shall be performed by a certified soils analyst by the state of California. Provide the following tests and submit the results to the City:

   - Existing Site Soil: Provide two separate tests at distinctly separate on-site locations, for agricultural suitability, fertility, particle size analysis; including recommendations for soil amendment, and fertilization during the maintenance period.
   - Import Soil: Submit test reports of representative sample(s) for approval prior to delivery and for every 100 yards delivered to the site. Test for agricultural suitability, fertility, particle size analysis; including recommendations for soil amendment, and fertilization during the maintenance period.

Replace 1st paragraph of Section 20-1.03C(2) Remove Existing Plants with:

Removal of existing plants includes removing their stumps and roots 2 inches or larger in diameter to a minimum depth of 24 inches below finished grade. Backfill holes resulting from stump removal to the finished grade with material obtained from adjacent areas.

Replace Section 20-1.03D Cultivation with:

All planting areas to be cultivated. The areas to be cultivated must extend 12 inches beyond the outer limit of each planting area.

Repeat cultivation until the soil is loose to a minimum depth of 12 inches. Soil clods must not be larger than 1 inch in maximum dimension after cultivation.

Remove native soil as needed prior to adding amendments, to allow for addition of compost amendment and mulch to achieve final grades.

Bring to the surface encountered rocks or debris during soil preparation work in planting areas. Remove rocks or debris larger than 1 inch in maximum dimension.

Place compost amendment and till to a depth of twelve inches.

Roll compact soil to achieve compaction of 85% of dry weight density in areas where plantings are located.

After natural settlement and light rolling, the complete work to conform strictly to the lines, grades and elevation indicated, under the contract without additional cost to the City.

Finish grading of landscape areas: fine grade all prepared planting areas to lines and grades shown on plans and as specified within this section. Finish grade to account for placement of specified mulch.

Top of finished mulch surface to be 1/2” below adjacent pedestrian or bicycle paths unless otherwise specified on civil grading plans.

Add to Section 20-1.04 PAYMENT:

Trees to be paid as each regardless of species per bid item list.

Add to Section 20-3.01B(2) GENERAL, Materials - Plants:

1. Any requests for plant material substitutions must be accompanied by documentation of inability to locate plants, including a list of plant nurseries contacted (minimum of three).
2. Substitutions may be denied if plant material is available at regional wholesale nurseries.
3. Submit photos of all trees for approval by Landscape Architect prior to purchase.

Replace Section 20-3.01B(7) GENERAL, Materials – Root Barrier with:

Root barrier must be an injection-molded or extruded modular panel made of high-density polypropylene or polyethylene plastic.

Each panel must:

1. Be at least: 1/8 inch
2. Have at least 4 molded root-deflecting vertical ribs from 0.5 to 0.8 inch wide and 6 to 8 inches apart
3. Have a locking strip or an integral male-female sliding lock designated to resist slippage between panels
4. Be at least 2 feet wide and 3 feet deep.

Add to Section 20-4.01A GENERAL, Summary:

Provide a one(1) year plant establishment and maintenance period for this project. The one year plant establishment and maintenance period will not begin until all other work of the project is complete and the project is accepted by the City. The City will issue a separate purchase order for the one year plant establishment and maintenance period directly to the contractor or subcontractor for this item of work. Payment of this lump sum bid item will be made on a quarterly basis (1/4 of the Lump Sum bid item price) upon acceptance of each maintenance quarter.

Add to Section 20-5.03A(1)(a) INERT GROUND COVERS AND MULCHES, General – General - Summary:

Mulch to be applied to all planting areas. Mulch in planting areas shall be 3” depth walk on bark – fir bark mulch, 1” pieces and smaller. Contractor shall provide sample for approval. Mulch shall be free of weed seeds or substances injurious to plant growth.

Add to Section 20-5.03A(3)(c) INERT GROUND COVERS AND MULCHES, General – Construction - Treatment of Soils:

Do not apply pre-emergent herbicide for weed control.
Contractor to carry out manual removal of weeds prior to planting.

ADD SECTION 20-5.03D(2)(C) GRANITECRETE PAVING, General, Summary:
Section Includes: Crushed aggregate blended with GraniteCrete admixture surfacing.

QUALITY ASSURANCE:

1. Installations 500 square feet and over up to 3,000 square feet must be a recommended installer at a minimum. Installations 3,000 square feet and over must be an Approved Installer.
2. An installer not approved, but with sufficient experience for the project as determined by Granitecrete, Inc., may fulfill this requirement by providing a current letter from Granitecrete, Inc. verifying their ability to complete a successful installation for this specific project. For assistance, contact GraniteCrete, Inc. at (800) 670-0849.
3. Porous Base Rock Testing:
   - Testing shall occur during installation at 1 ton increments of shipping for sieve conformance. Results shall be submitted prior to completion of the stone base installation.
     a. The stone field area shall have a permeable rate no less than 14” per hour. The testing shall be per Din 8035 Part 7, ASTM 2434 (constant head), or ASTM F2898 testing methods.
     b. In addition to the lab testing, after installation of any aggregate base cross-section, designed to conduct rainfall to the sub-soils and/or under-drain system, the finished aggregate base shall be tested, *in situ* for infiltration rate, using method ASTM F2898. The test shall be performed by a registered Geotechnical Engineer or certified agronomist. Testing shall be provided by an independent testing agency hired by the city and shall be scheduled by the contractor.

- The Contractor is responsible to meet this performance specification, before proceeding with installation, and shall bear the cost of the on-site testing and the cost of any additional work necessary to achieve compliance with the specification.

- All test results shall be logged and documented by the Owner's Technical Representative or Geotechnical Engineer. If at any time the processed stone base does not meet specifications, it shall be the Contractor's responsibility to restore, at his expense, the processed stone base to the required grade, cross-section and density.

- After the contractor has independently confirmed compliance with all the

above tolerances (planarity and elevation verified by a licensed surveyor and compaction, gradation, & permeability verified by Geotechnical Engineer, he shall notify the appropriate party and schedule a final inspection for approval. The contractor shall make available an orbital laser system to the Inspection Team for the inspection process.

- The compaction rate for porous base rock should be 88%. The compaction rate for non-porous base rock should be 95%.

MOCK-UP

1. Construct mockup of 10 square feet minimum of crushed aggregate blended with GraniteCrete admixture surfacing, including base course and edging, at location approved by Owner's Representative. Build mockup 5 days prior to installation. Intent of the mockup is to demonstrate surface finish, texture, color and standard of workmanship
2. Notify Owner's Representative 3 days in advance of mockup construction.
3. Allow Owner's Representative to view and obtain approval of mock-up before proceeding with rest of crushed aggregate blended with GraniteCrete admixture surfacing.
4. Approved mock-up may remain as first in place construction.

DELIVERY, STORAGE, AND HANDLING

Deliver all GraniteCrete Admixture materials in original, unopened packaging. Protect materials and aggregate from contamination with foreign matter. Store under waterproof cover and protect from dampness.

FIELD CONDITIONS

1. Do not install crushed aggregate blended with GraniteCrete admixture surfacing when sub-base is wet at saturated field capacity.
2. Do not install GraniteCrete materials when rain will fall on it within 48 hours after the install, or when the temperature will go below freezing within the next five days following installation.

PRODUCTS

Crushed aggregate blended with granitecrete admixture surfacing materials. Products listed below or City approved equal.

1. GraniteCrete, Inc. 419 Webster Street, Suite 202 Monterey, CA 93940
   Phone: (800) 670-0849; Fax: (800) 670-0849
   www.granitecrete.com
2. GraniteCrete admixture is an all-natural product and does not contain oils, polymers, resins, or enzymes.
3. Decomposed Granite (DG), crushed aggregate.

1. DG shall have a 3/8” maximum gradation, produced from naturally friable rock/granite with enough fines to produce a smooth walking surface. Materials should be free from clay lumps, organic matter, and deleterious material. Blends of coarse sand and rock dust are not acceptable.
2. Use a single supply source for the entire quantity required.
3. Gradation, in accordance with ASTM C136:
4. Color: Should have gold to yellow hues. To be selected by Landscape Architect from manufacturer’s standard colors.
5. Supplier: Vineyard Rock Products, Hollister, CA. - (831) 637-6443[Or equal].

4. Aggregate binder: Provide GraniteCrete Admixture. Color: To be selected from manufacturer’s full range of colors.
5. Base course material
   A. Class II Permeable Base Rock.
   B. Soft stone materials (i.e. sandstone, limestone and shale materials) are not suitable. Stone supplier shall certify that all supplied stone will be clean of this type of stone. All types of stone shall meet the following stability requirements.

TEST METHOD	CRITERIA
LA Abrasion (Calif. Test 211)	Not to exceed 40
Durability Index (Calif. Test 229)	Not less than 40

   In addition, if stone stability to water and vehicles is in question, Owner has the right to perform additional testing to ensure material shall adhere to requirements of Caltrans Section 68, as well as additional applicable ASTM tests.
   C. All testing fees shall be paid for by the Contractor.
   D. Permeable Stone: Stone base materials shall be washed, 100% fractured**,** by mechanical means, with elongated characters on each individual particle larger than 1/4”. Materials shall be devoid of mineral fines. All particles smaller than 1/4” shall be produced by manufactured means only. Rounded sands or aggregates are prohibited.
   E. Delivery Moisture Content: Processed stone shall contain 90% to 110% of the optimum moisture content to ensure that fines do not migrate in transit or during placement and to facilitate proper compaction. The contractor shall ensure that aggregate leaving the source plant meets this requirement. The contractor is required to apply water to the processed stone on site to attain and maintain this minimum moisture content.
6. Accessories
   A. Water: Free from contaminants that would discolor or be deleterious to crushed aggregate blended with GraniteCrete

admixture surfacing.

7. Installation: Do not use a vibratory plate to compact the GraniteCrete. Use a lawn roller filled with water to compact the GraniteCrete. Use a 36" drum roller or dual-drum roller in **static position** for driveways and larger installations. It is highly recommended to use a volumetric truck for driveways and larger installations; if possible, the use of a paver is highly recommended as well.

EXECUTION

EXAMINATION

1. Examine grading and subsoil conditions. Do not proceed until conditions are acceptable.

PREPARATION

1. Excavation: Excavate to depth required so edges of crushed aggregate blended with GraniteCrete admixture surfacing will match adjacent grades and have a maximum cross slope of 1 percent.
2. Sub-grade Preparation: Comply with Caltrans Standard Specifications Section 301-1 – “Sub-grade Preparation.”
3. Base Course Installation: Class II permeable base rock at 90% compaction.
4. Install per manufacturer’s recommended method.

Add to Section 20-5.05A SITE FURNISHINGS, General:

Provide manufacturer’s specifications and descriptive literature, installation instructions, and maintenance information for all site furnishing products.

Replace Section 20-5.05B SITE FURNISHING, Materials with:

1. **Bench**
   - Model per City Standard 9040 with two center armrests.
2. **Triple Stream Waste Receptacle**
   - Manufacturer: Big Belly
   - Product: HC5/SC.5/SC.5.5 Triple Station

   OPTIONS:

   Enclosed Hopper for Landfill Waste, Recycling and Compost
   Foot Pedal
   Graphic Wrap - Pattern to be provided by the city.
   Surface mount per manufacturer, epoxy set.
3. **Moveable Bistro Table – City Furnished and Installed**
   - Manufacturer: webstaurantstore.com
   - Product: Lancaster Table & Seating Alloy Series 36”x36” Dining Height Outdoor Table with 4 Industrial Café Chairs
   - Color: Copper
4. **Planter Pot**
   - Manufacturer: Tournesol Siteworks
   - Product: Florence Lightweight GFRC Planter
   - Type A: FCR-482424

- Type B: FCR-3024

5. **Bike Rack**
   - Manufacturer: Peak Racks
   - Product: 4-bike single sided bike rack
   - 16” wheel spacing
   - Color: Black Powdercoat
6. **Drinking Fountain**
   - Manufacturer: Most Dependable Fountains
   - Product: 10145 SMSSFA
   - Options: Safe stream bubbler
   - Options: Paver extension bolts for installation to concrete subslab below pavers
   - Color: Black
7. **String Light Post**
   - Manufacturer: lightpolesplus.com
   - Product: *HP-RTAAVS-12-4030-C-AB-FP.* 12ft tall x 4”base OD x 3” top OD x .125” thick, round tapered aluminum Arlen Style Anchor Base Light Pole
   - Color: Black powder coat
   - No light fixture for top mounting.
   - Pole should be ordered with hand hole cut out for receptacle per detail
   - Aluminum acorn post cap for 3” post, black powder coat finish available from www.signaturestreetscapes.com
8. **Cast Bronze Plaque**
   - 8” x 12” x ½” thick cast bronze plaque
   - Blind stud mount
   - Graphic file to be provided by owner
9. **Decorative Utility Lid Covers**
   - Manufacturer: Wundercovers
   - Product: Paver Style to fit bricks, Stainless Steel frame
   - Size: Per Plans
10. **Trench Drain Grate**
    - Manufacturer: Iron Age Designs
    - Product: Oblio 4” x 18” heel proof trench grate to fit NDS Spee-D Channel
    - Finish: Baked On Oil Finish

Replace Section 20-5.05C Construction with:

EXAMINATION

Verify proper installation of mounting surfaces, preinstalled anchor bolts, and other mounting devices. Verify site is ready to receive site furnishing items prior to delivery.

INSTALLATION

Install site furnishings in accordance with approved shop drawings and manufacturer's installation instructions.

DIVISION V SURFACINGS AND PAVEMENTS

39 ASPHALT CONCRETE

Add to Section 39-1.02B MATERIALS, Tack Coat:

All vertical edges to be paved against shall be tack coated. These include, but are not limited to, curb faces, gutter lips, swale edges, cross gutter edges, and asphalt concrete edges.

Add to Section 39-1.03 HOT MIX ASPHALT DESIGN REQUIREMENTS:

Mix voids to be targeted at 4.0%. TSR to be minimum 70 in accordance with CTM 371.

Add to Section 39-6 PAYMENT:

The contract price paid per square foot of HOT MIX ASPHALT OVER PCC PATCH PAVING shall include full compensation for all labor, materials (including hot mix asphalt), tools, equipment and incidentals for completing AC patch repairs to the length, depth, and width shown on the plans. Work includes, but is not limited to, saw-cutting, grinding, removal and disposal of existing pavement, compaction of underlaying materials, tack coat, and placement and compaction of asphalt.

DIVISION VIII MISCELLANEOUS CONSTRUCTION

73 CONCRETE CURBS AND SIDEWALKS

Add to Section 73-1.03 CONSTRUCTION:

You must meet with the Engineer to complete the following coordination tasks:

1. Before saw-cutting to agree on the limits of demolition and removal.
2. After formwork is set, to verify that grades meet those stated on the Plans.
3. Upon completion of new curb and sidewalk installation to verify finished grades.

You must give the City 24-hour notice for inspection of formwork before pouring concrete.

You are responsible for storing existing signs and boxes for reuse.

All exposed concrete must be mission colored.

DIVISION IX TRAFFIC CONTROL DEVICES

84 MARKINGS

Add to Section 84-2.03C Application of Stripes and Markings:

Preformed thermoplastic is only allowed with the approval of the Engineer.

DIVISION X ELECTICAL WORK

86 ELECTRICAL SYSTEMS

Add to Section 86-1.07 SCHEDULING OF WORK:

Plaza power and lighting must not be disrupted for more than 8 hours or temporary generator must be provided. Plaza must maintain lighting throughout the project. After the temporary electrical service has been set, if service load allows, the contractor may use the temporary service for construction. All connection points must be locked off when not in use for construction.

See Appendix F for PG&E Handout Package for additional information.

DIVISION XII BUILDING CONSTRUCTION

99 BUILDING CONSTRUCTION

Add Section 99-1.01 GENERAL:

Fiber pulled through existing conduit must be an all-in-one 12-strand fiber optic cable. Fiber pull should run from the exterior conduit located at 879 Morro and will extend to Palm. Palm fiber shall extend to Broad and from Broad to Monterey at the manhole within the project site. Fiber pulled onto the project site to the restroom and kiosk shall be a minimum of 6-strand fiber optic cable.

See Appendix B for Technical Specifications for the project.
See Appendix C for City Communication Cabling Specifications for the project.
See Appendix I for the Geotechnical Engineering Report prepared for the project.
See Appendix K for Photos of Existing Restroom Chase for additional information.

DIVISION XIII APPENDICES

Add Section 100-1.01 APPENDICES:

Refer to Appendix A: Form of Agreement
Refer to Appendix B: Supplemental Technical Specifications
Refer to Appendix C: City Communications Cabling Specifications
Refer to Appendix D: Murray Adobe Recommendations
Refer to Appendix E: Archaeological Monitoring Plan
Refer to Appendix F: PG&E Handout Package
Refer to Appendix G: Asbestos Testing Report
Refer to Appendix H: Lead Testing Report
Refer to Appendix I: Geotechnical Engineering Report
Refer to Appendix J: Construction Staging Plan
Refer to Appendix K: Photos of Existing Restroom Chase

APPENDIX A - FORM OF AGREEMENT

THIS AGREEMENT, made on _____, by and between the City of San Luis Obispo, a municipal corporation and charter city, San Luis Obispo County, California (hereinafter called the Owner) and COMPANY NAME (hereinafter called the Contractor).

WITNESSETH:

That the Owner and the Contractor for the consideration stated herein agree as follows:

ARTICLE 1, SCOPE OF WORK: The Contractor shall perform everything required to be performed, shall provide and furnish all of the labor, materials, necessary tools, expendable equipment, and all utility and transportation services required to complete all the work of construction of

MISSION PLAZA ENHANCEMENTS, SPEC NO. 91439-01

in strict compliance with the plans and specifications therefor, including any and all Addenda, adopted by the Owner, in strict compliance with the Contract Documents hereinafter enumerated.

It is agreed that said labor, materials, tools, equipment, and services shall be furnished and said work performed and completed under the direction and supervision and subject to the approval of the Owner or its authorized representatives.

ARTICLE II, CONTRACT PRICE: The Owner shall pay the Contractor as full consideration for the faithful performance of this Contract, subject to any additions or deductions as provided in the Contract Documents, the contract prices as follows:

Item No.	Item	Unit of Measure	Estimated Quantity	Item Price (in figures)	Total (in figures)
1.					
2.					
3.					

BID TOTAL: $ .00

Payments are to be made to the Contractor in compliance with and subject to the provisions embodied in the documents made a part of this Contract.

Should any dispute arise respecting the true value of any work omitted, or of any extra work which the Contractor may be required to do, or respecting the size of any payment to the Contractor, during the performance of this Contract, said dispute shall be decided by the Owner and its decision shall be final, and conclusive.

ARTICLE III, COMPONENT PARTS OF THIS CONTRACT: The Contract consists of the following documents, all of which are as fully a part thereof as if herein set out in full, and if not attached, as if hereto attached:

1. Notice to Bidders and Information for Bidders
2. Standard Specifications and Engineering Standards
3. Special Provisions, any Addenda, Plans and Contract Change Orders
4. Caltrans Standard Specifications and Standard Plans 2015
5. Accepted Bid and Bid Bond
6. List of Subcontractors
7. Public Contract Code Sections 10285.1 Statement
8. Public Contract Code Section 10162 Questionnaire
9. Public Contract Code Section 10232 Statement
10. Labor Code Section 1725.5 Statements
11. Bidder Acknowledgements
12. Qualifications
13. Non-collusion Declaration
14. Agreement and Bonds
15. Insurance Requirements and Forms

ARTICLE IV INDEMNIFICATION: The Contractor shall indemnify, defend with legal counsel approved by City, and hold harmless City, its officers, officials, employees and volunteers from and against all liability, loss, damage, expense, cost (including without limitation reasonable legal counsel fees, expert fees and all other costs and fees of litigation) of every nature arising out of or in connection with the Contractor's negligence, recklessness or willful misconduct in the performance of work hereunder or its failure to comply with any of its obligations contained in this Agreement, except such loss or damage which is caused by the sole or active negligence or willful misconduct of the City. Should conflict of interest principles preclude a single legal counsel from representing both the City and the Contractor, or should the City otherwise find the Contractor's legal counsel unacceptable, then the Contractor shall reimburse the City its costs of defense, including without limitation reasonable legal counsel fees, expert fees and all other costs and fees of litigation. The Contractor shall promptly pay any final judgment rendered against the City (and its officers, officials, employees and volunteers) with respect to claims determined by a trier of fact to have been the result of the Contractor's negligent, reckless or wrongful performance. It is expressly understood and agreed that the foregoing provisions are intended to be as broad and inclusive as is permitted by the law of the State of California and will survive termination of this Agreement.

The Contractor obligations under this section apply regardless of whether such claim, charge, damage, demand, action, proceeding, loss, stop notice, cost, expense, judgment, civil fine or penalty, or liability was caused in part or contributed to by an Indemnitee. However, without affecting the rights of the City under any provision of this agreement, the Contractor shall not be required to indemnify and hold harmless the City for liability attributable to the active negligence of City, provided such active negligence is determined by agreement between the parties or by the findings of a court of competent

jurisdiction. In instances where the City is shown to have been actively negligent and where the City's active negligence accounts for only a percentage of the liability involved, the obligation of the Contractor will be for that entire portion or percentage of liability not attributable to the active negligence of the City.

ARTICLE V. It is further expressly agreed by and between the parties hereto that should there be any conflict between the terms of this instrument and the bid of said Contractor, then this instrument shall control and nothing herein shall be considered as an acceptance of the said terms of said bid conflicting herewith.

IN WITNESS WHEREOF, the parties to these presents have hereunto set their hands this year and date first above written.

CITY OF SAN LUIS OBISPO
A Municipal Corporation

_____
Whitney McDonald, City Manager

APPROVED AS TO FORM

_____
J. Christine Dietrick
City Attorney

CONTRACTOR:

Name of Company

By:_____
Name of CAO/President
Its: CAO/PRESIDENT

(2nd signature required if Corporation):

By:_____
Name of Corporate Officer

Its: _____

APPENDIX B – SUPPLEMENTAL TECHNICAL SPECIFICATIONS

Table of Contents

07 4113	**Metal Roof Panels**
07 4213	**Metal Wall Panels**
07 6200	**Sheet Metal Flashing and Trim**
07 7123	**Manufactured Gutters and Downspouts**
07 9200	**Joint Sealants**

DIVISION 08 - OPENINGS

08 1113	**Hollow Metal Doors and Frames**
08 3313	**Coiling Counter Doors**
08 4313	**Aluminum-Framed Storefronts**
08 6200	**Unit Skylights**
08 7100	**Door Hardware**
08 8000	**Glazing**

DIVISION 09 - FINISHES

09 2116	**Gypsum Board Assemblies**
09 2236	**Lath**
09 2400	**Cement Plastering**
09 2523	**Lime Based Plastering**
09 3000	**Tiling**
09 9113	**Exterior Painting**

DIVISION 10 - SPECIALTIES

10 1313	**Electronic Directories**
10 1400	**Signage**
10 2113.17	**Phenolic Toilet Compartments**

10 2800 **Toilet, Bath, and Laundry Accessories**

DIVISION 22 - PLUMBING

22 0000 **Plumbing**

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

23 0013 **General Mechanical Requirements**

DIVISION 26 - ELECTRICAL

26 0500 **Common Work Results for Electrical**

26 0519 **Low Voltage Electrical Power Conductors and Cables**

26 0526 **Grounding and Bonding for Electrical Systems**

26 0533 **Raceways and Boxes for Electrical Systems**

26 0534 **Cabinets**

26 0546.13 **Electric Utility Systems**

26 0900 **Controls and Instrumentation**

26 2416 **Panelboards**

26 2726 **Wiring Devices**

26 5100 **Interior Lighting**

26 5600 **Exterior Lighting**

26 5670 **Lighting Acceptance Testing**

DIVISION 27 - COMMUNICATIONS

27 0500 **Common Work Results For Communications**

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 1416 **Brick Unit Paving**

This page intentionally left blank

Section 01 3300
Submittals

PART 1 GENERAL

1.01 Submittals

A. Submittals shall be provided in accordance with City of San Luis Obispo Standard Specification Section 5-1.23.

PART 2 - PRODUCTS

PART 3 - EXECUTION

This page intentionally left blank

Section 01 4000
Quality Control

PART 1 - GENERAL

1.01 Quality Control

A. Quality Control shall be completed in accordance with City of San Luis Obispo Engineering Standards and Standard Specifications and Caltrans Standard Specifications. See Section 6 for Control of Work and Appendix J for the City's Quality Assurance Program.

PART 2 - PRODUCTS

PART 3 - EXECUTION

This page intentionally left blank

Section 03 0516
Underslab Vapor Barrier

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheet vapor barrier under new concrete slabs on grade.

1.02 RELATED REQUIREMENTS

A. Section 02 4119 - Selective Structure Demolition

B. Section 03 1000 - Concrete Forming and Accessories: Forms and accessories for formwork.

C. Section 03 2000 - Concrete Reinforcing.

D. Section 03 3000 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.03 REFERENCE STANDARDS

A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.

B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products.
   1. Manufacturer’s samples and literature.
   2. Manufacturer’s installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
   3. Summary of test results per paragraph 9.3 of ASTM E1745.
   4. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

C. Test Data: Submit report of tests showing compliance with specified requirements.

D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Underslab Vapor Barrier:
   1. Water Vapor Permeance: Not more than 0.010 perms, maximum [grains/(ft2 ? hr ? inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
   2. Complying with ASTM E1745 Class A.
   3. Thickness: 15 mils.
   4. Manfacturers:
      a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil) Basis of Design: www.stegoindustries.com.
      b. Perminator 15 mils, polyolefin by W.R. Meadows.
      c. Moistop Ultra 15 mils, polyolefin by Fortifiber
      d. VaporBlock 15 mils, polyethylene by Raven Industries.

B. Accessory Products: Vapor barrier manufacturer's recommended tapes, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier and forming/screeding accessories to prevent undue penetrations of the membrane.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.02 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
   1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
   2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
   3. Apply seam tape/textured tape/double-sided tape to a clean and dry vapor barrier.
   4. Seal all penetrations (including pipes) per manufacturer’s instructions.
   5. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not leave punctures in the vapor barrier.
   6. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

B. Lap joints minimum 6 inches and seal with manufacturer's tape.

C. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

D. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.

E. Repair damaged vapor retarder before covering with other materials.

F. Where installing in existing building tie into existing vapor barrier if possible.

END OF SECTION

This page intentionally left blank

Section 03 1000
Concrete Forming and Accessories

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

B. Installation of items to be embedded in concrete, such as anchor bolts, inserts, embeds, and sleeves.

C. Openings for other work.

D. Form accessories.

E. Form stripping.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, Including General and Supplementary Conditions Division 01 Specification Sections, apply to this Section

B. Section 03 2000 - Concrete Reinforcing.

C. Section 03 3000 - Cast-in-Place Concrete.

D. Section 04 2000 - Unit Masonry: Reinforcement for masonry.

E. Section 05 1200 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 301 - Specifications for Concrete Construction; 2020.

C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

D. ACI 347R - Guide to Formwork for Concrete; 2014.

E. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide data on void form materials and installation requirements.

C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties. Review and approval will not include form strength and adequacy.

D. Keep an accurate record of the dates of removal of forms, form shores and reshores, and furnish copies to the SEOR.

1.05 QUALITY ASSURANCE

A. Comply with the pertinent provisions of 01 40 00 "Quality Requirements."

B. Construct forms according to ACI 347, "Guide to Formwork for Concrete," and conforming to tolerances of ACI 117, "Standard Specifications for Tolerances for Concrete Construction and Materials"

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Division 01 Section 01 60 00 "Product Requirements," delivering materials in a timely manner to ensure uninterrupted progress.

B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.

C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

D. Comply with relevant portions of ACI 347R, ACI 301, and ACI 318.

2.02 WOOD FORM MATERIALS

A. Softwood Plywood: PS 1, B-B Medium or High Density Concrete Form Overlay, Class I, grade marked, not mill oiled.

B. Lumber: DF species; WCLIB Construction grade or better, WWPA No. 1 grade or better; with grade stamp clearly visible.

2.03 REMOVABLE PREFABRICATED FORMS

A. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches thick.

2.04 FORMWORK ACCESSORIES

A. Form ties: Prefabricated rod, flat band, wire, internally threaded disconnecting ty pe, or equal, not leaving meatl within 1-1/2" of concrete surface.

B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
   1. Do not use materials containing diesel oil or petroleum-based compounds.

C. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 1200.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete. Sides of all footings and grade beams shall be formed, unless the member detail provies at least 3" clear cover to reinforcement and indicates the member is cast against earth. Remove formwork prior to backfilling operations.

3.03 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Rigidly construct forms to prevent mortar leekage, sagging, displacement or bulging between studs. Use clean, sound, approved form material, coated with specified materials only, not oil. Provide backing on all plywood joints.

C. Coat forms with the specified resin coating, not form oil. Construct forms to exact shapes, sizes, lines and dimensions required to obtain level, plumb, and straight surfaces. Provide openings, offsets, keys, reglets, anchorages, recesses, moldings, chamfers, blocking, screeds, drips, bulkheads, and all other required features. Make forms easily removable without hammering or prying against concrete. Space forms apart with metal spreaders. Construct forms to accurate alignment, locations and grades, and provide against sagging, leakage of concrete mortar, or displacement occuring during and after placing of concrete. Coordinate installation of inserts and anchors in forms according to shop drawings and requirements for work of other sections.

D. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

E. Corners and angles: Provide 3/4" x 3/4" beveled chamfer strips for all exposed concrete corners and angles square unless indicated otherwise.

F. Reglets and Rebates: Form required reglets and rebates to receive frames, flashing and other equipment. Obtain required dimnesions, details, and precise positions for work to be installed under other sections and form concrete accordingly.

G. Form Joints: Align joints and make watertight. Keep form joints to a minimum. Fill joints to produce smooth surfaces, intersections, and arises. Use polymer foam or equivalent fillers at joints and where forms abut or overlap existing concrete to prevent leakage of mortar.

H. Recesses, Drips, and Profiles: Provide smooth milled wood or pre-formed rubber or plastic shapes of types shown and required.

I. Cleanouts and Cleaning: Provide Temorary openings in all wall forms and other vertical forms for cleaning and inspection. Clean forms and surfaces to receive concrete prior to placing.

J. Re-Use: Clean and Recondition form material before re-use.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. All necessary pipe sleeves, anchors, or other required inserts shall be accurately installed as part of the work of other sections, according to Specification Section 03 30 00, Section 1.3.B for sumittal requirements related to this scope.

B. Obtain approval before framing openings in structural members that are not indicated on drawings.

C. Provide formed openings where required for items to be embedded in passing through concrete work.

D. Locate and set in place items that will be cast directly into concrete.

E. Conduits or pipes:
   1. Locate so as not to reduce strength of the concrete
   2. Do not place pipes, other than conduits, in a slab 4-1/2" thick or less in any case. Conduit buried in a concrete slab shall not have an outside dimension greater than 1/3 the slab

thickness nor be placed below the bottom reinforcing or over the top reinf.

3. Sleeves: Pipe sleeves may pass through the slab or walls if not exposed to rusting or other deterioration and are of uncouted or galvanized iron or steel. Provide sleeves of diameter large enough to pass any hub or coupling on pipe, including any insulation.
4. Conduits may be embedded in walls only if the outside diameter does not exceed 1/3 the wall thickness, are spaced no closer than 3 diameters on centers and not impair the strength of the structure.

F. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

G. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

H. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.

I. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

J. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

3.07 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.

B. Deflection: Limit Deflection of forming surfaces from concrete pressure to L/240.

C. Finish Lines: Position formwork to maintain hardened concrete finish lines within following permissible deviations.

1. Variation from Plumb:
   - In 10'-0" 1/4 inch
   - In any story or 20'-0" 3/8 inch
   - In 40'-0" or more 3/4 inch
2. Variation from Level or Grades Indicated
   - In 10'-0" 1/4 inch
   - In any story or 20'-0" 3/8 inch
   - In 40'-0" or more 3/4 inch
3. Cross-Sectional Dimensions
   a. Minus 1/4 inch
   b. Plus 1/2 inch

3.08 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

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

3.09 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and all superimposed loads as determined by testing field cured cylinders, but not sooner than specified in ACI 347 Section 3.6.2.3. Load supporting forms may be removed when concrete has attained 75 percent of required 28 day compressive strength, but no sooner than 3 days, provided construction is reshored.
   1. Reshore structural members as specified per ACI 347.
   2. Avoid damage to concrete surfaces during removal.
   3. Remove formwork in same sequence as concrete placement to achieve similar concrete surface coloration.

END OF SECTION

Section 03 2000
Concrete Reinforcing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing Steel for Cast-in-Place Concrete Foundations

B. Reinforcing Steel for Cast-in-Place Concrete Slabs-on-Grade

C. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

A. Comply with pertinent provisions of Division 01, "General Requirements".

B. Section 03 1000 - Concrete Forming and Accessories.

C. Section 03 3000 - Cast-in-Place Concrete.

D. Section 04 2000 - Unit Masonry: Reinforcement for masonry.

E. Section 05 1200 - Structural Metal Framing

1.03 REFERENCE STANDARDS

A. ACI 301 - Specifications for Concrete Construction; 2020.

B. ACI 315 - Manual of Standard practice for Detailing Reinforced Concrete Structures; 2011.

C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

D. ACI SP-66 - ACI Detailing Manual; 2004.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

F. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.

G. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2007b (Reapproved 2014).

H. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars; 2001 (Reapproved 2007).

I. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

J. CRSI (DA4) - Manual of Standard Practice; 2009.

K. CRSI (P1) - Placing Reinforcing Bars; 2011.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include the following:
1. complete bar layout
2. representative sections
3. details for congested conditions
4. proposed layout where vertical and horizontal bars intersect
5. bar schedules
6. typical bending diagrams and offsets
7. shapes of bent bars
8. spacing of bars
9. splice lengths and locations

C. Where welding is proposed:
1. Detail welding to conform to AWS D1.4
2. Submit Copies of welding operator's certificate
3. Where reinforcement complying with ASTM A615 is to be welded, chemical tests shall be performed to determine the weldability in accordance with Section 3.5.2 of ACI 318-11.
4. Weld Procedure Specifications:
    a. All WPS's shall be submitted to the Structural Engineer of Record (SEOR) for review and approval prior to use.
    b. For WPS's that have been qualified by test, the supporting Procedure Qualification Record (PQR) shall be submitted to teh SEOR for review and approval.
    c. Included shall be WPS for repair welds

D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.05 QUALITY ASSURANCE

A. Comply with the pertinent provisions of 01 40 00 "Quality Requirements."

B. Perform work of this section in accordance with ACI 301.

C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.4/D1.4M and no more than 12 months before start of scheduled welding work.

1.06 DELIVERY STORAGE AND HANDLING

A. Comply with pertinent provisions of Division 01 Section 01 60 00 "Product Requirements," delivering materials in a timely manner to ensure uninterrupted progress.

B. Bundle bars, tag with identification, and transport and store so as not to damage any material. Use metal tags inicating size, length and other marking shown on placement drawings. Maintain tags after bundles are broken

C. Avoid exposure to dirt, moisture or conditions harmful to reinf.

1.07 EXTRA MATERIAL

A. Provide an allowance of an additional 10% of the total reinf. steel tonnage in addition to the quantities shown on the drawings. This additional steel shall be installed in sizes and locations as directed by the structural engineer.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Deformed billet-steel bars.
   2. Unfinished.
   3. Only to be used for conditions where bars will not be welded.

B. Reinforcing Steel: ASTM A706/A706M, Grade 60 (60,000 psi) deformed low-alloy steel bars.
   1. Unfinished.
   2. Used in all cases where welding of bars is required.

C. Reinforcement Accessories:
   1. Tie Wire: ASTM A82, Annealed copper bearing steel, minimum 16 gage, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement. Standard manufactured products shall conform to the Concrete Reinforcing Institute, "Manual of Stand Practice," latest edition.
   3. Use dense precast concrete supports with embedded wire ties for reinforcement placed on grade. Elsewhere, use wire bar supports.

D. Welding electrodes: AWS D1.4, Table 5.1 and 5.3, low hydrogen electrodes, E8018 for Grade 60 Steel.

2.02 Re-bar Splicing:

A. Coupler Systems: Mechanical devices for splicing reinforcing bars conforming to the requirements of ACI 318-11 Section 12.14.3; capable of developing 1.25fy of the steel reinforcing yield strength in tension and compression. For reinf.

   All mechanical splices in Special Structural Walls, Special Moment Frames and Concrete Diaphragms shall be Type 2 conforming to the requirements of ACI 318-11 Section 21.1.6 & 21.11.7.4, capable of developing 1.25fy of the steel reinforcing yield strength in tension and compression and develop the specified tensil strength of the spliced bar.
   1. Products:
      a. Dayton Superior Corporation; Bar Lock Coupler System: www.daytonsuperior.com (UES-ER 319).
      b. Lenton Lock Couplers (IAPMO-ES 129.

B. Dowel Bar Splicer with Dowel-Ins: Mechanical devices for connecting dowels; capable of developing full steel reinforcing design strength in tension and compression.

1. Products:
   a. Dayton Superior Corporation; UES-ER 319: www.daytonsuperior.com/#sle.
   b. Lenton Form Savers (IAPMO-ES 129).

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Bending and Forming
   1. Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurous to materials
   2. Do not heat reinforcement for bending
   3. Bend bars No. 6 size and larger in the shop only.
   4. Bars with unscheduled kinks or bends are subject to rejection.
   5. Use only tested and approved bar materials

C. Welding: Use only ASTM A706 steel where welding is proposed. Perform welding where shown or approved, by the direct electric arc process in accordance with AWS D1.4 using specified low hydrogen electrodes. Preheat 6" each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is prohibited. Do not tack weld bars. Welding shall not be done on or within two bar diameters of any bent portion of a bar that has been bent cold. Welding of crossing bars shall not be permitted for assembly reinforcement unless authorized by the SEOR. Clean metal surfaces to be welded of all loose scale and foreign material. C
   1. Use only ASTM A706 steel where welding is proposed.
      a. Perform welding where shown or approved, by the direct electric arc process in accordance with AWS D1.4 using specified low hydrogen electrodes.
      b. Preheat 6" each side of joint.
      c. Protect joints from drafts during the cooling process; accelerated cooling is prohibited.
      d. Do not tack weld bars.
      e. Welding shall not be done on or within two bar diameters of any bent portion of a bar that has been bent cold.
      f. Welding of crossing bars shall not be permitted for assembly reinforcement unless authorized by the SEOR.
      g. Clean metal surfaces to be welded of all loose scale and foreign material.
      h. Clean welds each time electrode is changed and chip burned edges before placing welds
      i. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration to the base metal.
      j. Cut out welds or parts of welds found defective with chisel and replace with proper welding
      k. Fillet welds may be considered prequalified per AWS D1.4, section 6.1.2.
      l. Other welds are to be qualified per AWS D1.4 Section 6.1.2.
   2. Where ASTM A615 steel is to be used or occurs in existing elements and is to be welded
      a. Complete chemical analyses shall be performed to determine chemical composition and, for a new bar, provided in the mill certifications to determine weldability in accordance with ACI 318 Section 3.5.2 with modifications per AWS D1.4.
      b. The carbon equivalency (CE) shall be clearly defined and bars with a CE above 0.75 shall not be welded.

c. Welding Procedure Specifications and supporting Procedure Qualification Records with required testing per AWS D1.4, shall be provided for review and approval prior to welding.
d. These WPS's and PQR's shall be specific to the CE as determined above, and shall, in addition to the other AWS requirement, include minimum and maximum preheat and interpass temperatures that are specified to the CE. This preheat and interpass temperature shall be strictly enforced in the field.
e. If separate shipments of bars vary the weldability, the process listed in the above requirements shall be repeated for these new bars.

D. Locate reinforcing splices not indicated on drawings at point of minimum stress. Review locations of splices with SEOR.

PART 3 EXECUTION

3.01 PLACEMENT

A. Before placing bars, and again before concrete is placed, clean bars of loose rust and/or mill scale, dirt, oil, or any other coating that may be deleterious or could reduce bond with the concrete.

B. Securing in place:
1. Accurately place bars and wire tie in precise position where bars cross.
2. Bend ends of wire ties away from the forms.
3. Wire tie bars to the corners of ties and stirrups.
4. Support bars according to the Concrete Reinforcing Steel Institute (CRSI) "Placing Reinforcing Bars," using approved accessories and chairs.
5. Place precast concrete cubes with embedded wire ties to supporting reinforcing steel bars in concrete placed on grade and in footings.
6. Take adequate precautions to ensure that reinforcing bar position and spacing is maintained during concrete placement.

C. Do not displace or damage vapor barrier.

D. Maintain concrete cover around reinforcing as follows:
1. Refer to Drawings for cover requirements

E. Splices:
1. Do not splice reinforcing bars at the points of maximum stress except where indicated.
2. Lap splices as shown or required to develop the full strength or stress of the bars.
3. Stagger splices in horizontal wall bars at least 48" longitudinally in alternate bars and opposite faces.

F. Field Welding: As specified for fabrication.

3.02 FIELD QUALITY CONTROL

A. Comply with all pertinent provisions of Division 01 Section 01 40 00 "Quality Requirements".

B. Supervision: Perform Work to this Section under supervision of a capable superintendent.

C. An independent testing agency, as specified in Section 01 40 00, shall inspect installed reinforcement for conformance to contract documents before concrete placement.

D. Where welding is done in the shop or at the site, perform welding of reinforcing bars under inspection of the Testing Laboratory Welding Inspector in accordance with Chapter 17 of the CBC. The welding inspector shall make a systematic record of all welds:
   1. Identification marks of welders;
   2. List of defective welds;
   3. Manner of correction of defects.

   The welding inspector shall check the material, equipment details of construction and procedures as well as the welds. The inspector shall check the ability of the welder. The welding inspector shall furnish the structural eingeer and the enforcement agency with a verified report that the welding which is required to be inspected is proper and has been done in confromity with the approved plans and specifications. The welding inspector shall use all means necessary to determine the quality of the weld. The inspector may use gamma ray, magnaflux, trepanning, sonics or any other aid to visual inspection, which the inspector may deem necessary to assure the adequacy of the welding.

END OF SECTION

Section 03 3000
Cast-in-Place Concrete

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section Includes cast-in-place concrete, concrete materials, mixture design, placement procedures and finishes for the following:

B. Floors and slabs on grade.

C. Joint devices associated with concrete work.

D. Concrete curing.

E. Concrete foundations

F. Concrete footings

G. Concrete walls

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, Including General and Supplementary Conditions Division 01 Specification Sections, apply to this Section

B. Section 03 1000 - Concrete Forming and Accessories: Forms and accessories for formwork.

C. Section 03 2000 - Concrete Reinforcing.

D. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Concrete Construction; 2020.

D. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

F. ACI 305R - Hot Weather Concreting; 2010.

G. ACI 306R - Cold Weather Concreting; 2010.

H. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).

I. ACI 309R - Guide for Consolidation of Concrete

J. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

L. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2015.

M. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.

N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

P. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.

Q. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.

R. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.

S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

T. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

U. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

V. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.

W. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Comply with the pertinent provisions of Section 01 60 00 " Product Requirements." Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
   1. Material Certificates: For Each of the following, signed by the manufacturer(s)

a. Cementitious materials
b. Admixtures
c. Curing compounds
d. Non-shrink grout

2. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with the requirements:
   a. Aggregates

C. Mix Design: Submit proposed concrete mix design(s). For each concrete mixture:
   1. Inidcate Intended Locations for use
   2. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   3. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
      a. Mixes shall be based on existing approved compressive strength test data for concrete mixes in accordance with ACI 318 Section 5.3.1.1 and requirements below:
         1) Strength Requirements: Design mixes for structural concrete for minimum 28-day compressive strengths required by Drawings and Specifications. The trial batch strength for each mix shall exceed indicated or specified strength by 750 psi or a lesser amount based on the standard deviations of strength test records according to ACI 318.
         2) Normal Weight Concrete Mix Design: Design all mixes for workability and durability of concrete. Control the mixes in accordance with the CBC, ACI 318 Section 5.2, ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete, and Chapter 4, ACI 318, Building Code Requirements for Reinforced Concrete. Make adjustments in cement content required for concrete strengths at Contractor's expense and do not exceed 0.50 (or as indicated on concrete general notes of approved plans) absolute water-cement or cement plus fly ash ratio by weight. Do not use calcium chloride or any admix containing such material. Admixtures containing a material releasing nitrates in solution are limited to 0.06 percent by weight for the chloride ion.
         3) Maximum Aggregate Sizes: Not exceeding 3/4 of minimum clear space between bars and
            between bars and forms, nor larger than 1/5 of least dimensions between the forms.
            Design the mixes with 1" maximum size, except maximum 1-1/2" size for foundations as submitted by the contractor and approved by the Architect and Structural Engineer of Record.
         4) Pumped Concrete: Design Concrete mixes specifically for pump placing with dry loose volume of fine aggregates not more than 47 percent of total aggregates.
         5) ACI 318 Section 5.3.1.1 with test records. Where a testing laboratory acceptable to the enforcement agency has records of compressive strength tests, a standard deviation shall be established. Test records from which a standard deviation is calculated shall:
            (a) Represent materials, quality control procedures and conditions similar to those expected, and changes in materials and proportions within the test records shall not have been more restricted than those for proposed work.
            (b) Represent concrete produced to meet a specified strength or strengths f’ c within 1,000 psi of that specified for proposed work.

(c) Must consist of at least 30 consecutive tests or two groups of consecutive tests totaling at least 30 tests as defined in ACI 318 Section 5.3.1.1, except as provided in ACI 318 Section 5.3.1.2.

4. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

D. Samples for Pigment Color Selection: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.

E. Verification Samples: Submit sample chips of specified colors indicating pigment numbers and required dosage rates, for subsequent comparison to installed concrete.

F. Test Reports: Submit report for each test or series of tests specified.

G. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

H. Delivery Tickets: With each transit truck provide delivery ticket, signed by an authorized representative from the batch plan, containing all information required by ASTM C94, as well as time batched, type of brand of cement, cement content, maximum size of aggregate and total water content.

1.05 QUALITY ASSURANCE

A. Comply with the pertinent provisions of 01 40 00 "Quality Requirements."

B. Qualifications
1. Installer Qualifications: And experienced installer who has completed concrete work similar in material, design, and extendt to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance. Adequate numbers of trained and experienced personnell shall be used.
2. Manufacturer Qualifications: The production facility supplying hydraulic cement concrete shall have a current Certification of Ready Mixed Concrete Production Facilities from the National Ready Mixed Concrete Association, or equivalent.
3. Concrete Testing and Inspection Services: The owner shall engage a qualified Independent Testing Agency to perform evaluation test and special inspections per Structural Notes on Drawings and as required per the code. Personnel conducting test shallbe qualified as ACI Concrete Field Testing Technician, Grade 1 according to ACI CP-1 or an equivalent program.

C. Perform work of this section in accordance with ACI 301 and ACI 318.
1. Maintain one copy of each document on site.

D. Source Quality Control: Refer to the following paragraphs for specific procedures. Concrete materials which, by previous tests or actual service, have shown conformance may be used without testing when so approved by SEOR. Testing laboratory shall perform the following conformance testing
1. Cementitious Material Test: The concrete supplier shall furnish to the enforcement agency certification from the cement manufacturer that the cement proposed for use on the project has been manufactured and tested in compliance with the requirements of ACI 318-11 Section 3.2.1 and the ASTM standards listed in the materials section of this Specification.

2. Aggregates for Normal Weight Concrete: Test the aggregate before and after concrete mix is designed and whenever character of aggregate varies or source of material is changed in accordance with ASTM C33 and CBC. Include a sieve analysis. Obtain samples of aggregates at the dry batching or ready-mix concrete plant in accordance with ASTM D75 and perform tests for the properties listed in the following table:

Physical Properties		
Physical Properties, units	Test Method	Minimum Values
Sieve analysis	ASTM C136	Loss after 5 cycles not more than 8 percent of coarse aggregate, nor more than 10 percent of fine aggregate
Organic impurities	ASTM C40	Fine aggregate not darker than reference standard color
Soundness	ASTM C88	
Abrasion	ASTM C131	Weight loss not more than 10.5 percent after 100 revolutions, 42 percent after 500 revolutions
Deleterious materials	ASTM C33, C330	
Materials finer than No. 200 sieve	ASTM C117	Not over 1 percent for gravel, 1.5 percent for crushed aggregate
Reactivity potential	ASTM C227, C289, C342	Ratio of silica released to reduction in alkalinity not to exceed 1.0.
Sand equivalent	ASTM D2419	California sand equivalent values operating range not below 71 percent

3. Concrete Batch Plant Inspections: Conform to CBC and ACI. Continuous batch plant inspection is required for structural concrete, performed by a specially qualified inspector.

E. Compliance with Regulations: All materials shall comply with the current rules and regulations of the local air quality management district, with the rules regarding volatile organic compounds, and with FDA rules and regulations for dangerous substances in construction products.

F. Allowable Tolerances: Construct concrete conforming to the tolerances specified in ACI 117 "Recommended Tolerances for Concrete Construction and Materials", as applicable, unless exceeded by the requirements of regulatory agenciesor otherwise indicated or specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01 60 00, "Product Requirements."

B. Ready-mix concrete shall be mixed and delivered in accordance with ASTM C 94. Each batch of concrete delivered to the Project site shall be accompanied by a time slip bearing departure time and signature of batch plant supervisor. Concrete shall be placed within 90 minutes after start of mixing. Concrete which has developed initial set shall not be used. Concrete which has partially hardened shall not be used. Deliver all materials in timely manner to ensure uninterrupted progress of the work.

C. Deliver, store and handle all cement and aggregate materials so as to prevent their deterioration or intrusion by foreign matter. Deteriorated or contaminated materials shall not be furnished.

1.07 JOB CONDITIONS

A. Cold Weather Requirements:
   1. Follow recommendations of ACI 306R when concreting during cold weather.
   2. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather. Surfaces, in which concrete is to come in contact with, shall be free from frost or ice. No frozen materials or materials containing ice shall be furnished.
   3. When placing concrete during freezing or near-freezing weather the mix shall have a temperature of at least 50 degrees F., but not more than 90 degrees F. when cement is added. Concrete shall be maintained at a temperature of at least 50 degrees F. for at least 72 hours after placing or until it has thoroughly hydrated. When necessary, concrete materials shall be heated before mixing. Special precautions shall be provided for protection of transit-mixed concrete.

B. Hot Weather Requirements:
   1. Follow recommendations of ACI 305R when concreting during hot weather.
   2. During hot weather, proper attention shall be provided for ingredients, production methods, handling, placing, protection and curing, to prevent excessive concrete temperatures or water evaporation which could impair required strength or durability.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 1000.

2.02 REINFORCEMENT MATERIALS

A. Comply with requirements of Section 03 2000.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type II - Moderate Portland type, low alkali. Provide Type V where concrete is in contact with soil corrosive to concrete. Use Type III from one batch by a single source for all architecturally exposed concrete.

B. Fine and Coarse Aggregates: ASTM C 33, C330, and C 227, from approved pits, free from vegetable matter and of opaline, feldspar, or siliceous magnesium substances; all washed, clean,

hard, fine-grained sound crushed rock or gravel; not over 5 percent by weight of flat, thin, elongated, friable, or laminated pieces (pieces having major dimension over 5 times average dimension) or more than 2 percent by weight of shale or cherty material. Any suitable individual grading of coarse aggregate may be furnished, provided Grading of Combined Aggregate indicated in following table is obtained.

GRADING OF COMBINED AGGREGATE			
Sieve Number or Size in Inches	1-1/2" Maximum (Percent)	1" Maximum (Percent)	3/4" Maximum (Percent)
Passing a 2"	-	-	-
Passing a 1-1/2"	95-100	-	-
Passing a 1"	70-90	90-100	-
Passing a 3/4"	50-80	70-95	90-100
Passing a 3/8"	40-60	45-70	55-75
Passing a No. 4	35-55	35-55	40-60
Passing a No. 8	25-40	27-45	30-46
Passing a No. 16	16-34	20-38	23-40
Passing a No. 30	12-25	12-27	13-28
Passing a No. 50	2-12	5-15	5-15
Passing a No. 100	0-3	0-5	0-5

C. Water: Water shall be potable and free from deleterious matter or shall otherwise satisfy the requirements of ASTM C1602.

D. Pozzolan: ASTM C618, Class F or N Fly Ash (Class C Not permitted) subject to the conditions of the CBC, containing two percent or less carbon. Fly ash shall not be used in excess of 15 percent by weight of total cement quantity for structural concrete. Where fly ash replacement is 25% or higher, maximum water-cement ratio shall be 0.45. Fly ash need not be included in lightweight concrete mix designs.

E. Water: Clean, potable and not detrimental to concrete, complying with ASTM C94 and ASTM C1602

2.04 ADMIXTURES

A. Admixtures to be used in concrete shall be subject to prior approval by the Structural Engineer. Where more than one admixture is used, they shall be compatible. Use of admixtures shall be consistent throughout Work.

B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

C. Air Entrainment Admixture: ASTM C260/C260M.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
   1. Super-Plasticizers (High Range Water Reducers): ASTM C494, Type F. Capable of producing concrete which can be placed at 8 11 inch slump without segregation, capable of maintaining slump within 2" of that initially mixed for 2 hours, and of maintaining concrete temperature within 2 degrees F. from time of batching for 2 hours minimum.

E. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
   1. Only one brand. When used, are subject to approval of Structural Engineer of Record, and must reduce the mixing water at least 10 percent without entraining air in excess of 2 percent by volume. If the water reducing agent entrains more than 2 percent air, the water reduction shall be at least 12 percent, but in no case shall the water reducing agent entrain air in excess of 4 percent.

F. Water Reducing Admixture: ASTM C494/C494M Type A.
   1. Only one brand. When used, are subject to approval of Structural Engineer of Record, and must reduce the mixing water at least 10 percent without entraining air in excess of 2 percent by volume. If the water reducing agent entrains more than 2 percent air, the water reduction shall be at least 12 percent, but in no case shall the water reducing agent entrain air in excess of 4 percent.

G. Waterproofing Admixture: Admixture formulated to reduce permeability to liquid water, with no adverse effect on concrete properties.
   1. A crystalline permeability reducing admixture (PRAH) may be used in accordance with ACI 212.3R-10, where reduced concrete permeability is desired. Trial batches should be performed to ensure that the plastic and hardened properties of concrete meet expectations.
   2. Admixture Composition: Crystalline, functioning by growth of crystals in capillary pores.

2.05 ACCESSORY MATERIALS

A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
   2. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.
   3. non-gas-forming and free of oxidizing catalysts and inorganic accelerators, used as dry or damp pack, or mixed to a 20-second flow (CRC-C 611), without segregation or bleeding at any temperature between 45 degrees F and 100 degrees F.
   4. Low-Slump, Dry Pack Products:
      a. Drypack: Field mixture of I part Portland cement to 2 parts fine aggregate mixed to a damp consistency such that a ball molded in the hands will stick together and hold its shape. In lieu of field mixing, Contractor may use factory mixed drypack material, such as Master Builders "Set Grout." f'c shall be equal to 5,000 psi.

B. Non-Shrink Epoxy Grout: Moisture-insensitive, two-part; consisting of epoxy resin, non-metallic aggregate, and activator.

2.06 BONDING AND JOINTING PRODUCTS

A. Bonding Agent: "Weld-Crete," manufactured by Larsen Products Co., P.O. Box 2127, Rockville, MD 20852, Master Builders "Concresive," or equal.

B. Construction Joint Materials: "Key-Kold" or "Kwik-Joint," of profiles indicated.

C. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

D. Expansion Joint Fillers: Preformed strips, non-extruding and resilient bituminous type, of thickness indicated, conforming to ASTM D 1751 and ASTM D1752.

2.07 CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

B. Moisture-Retaining Sheet: ASTM C171.
   1. Curing paper, regular.
   2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

2.08 CONCRETE MIXING

A. Furnish ready-mixed concrete from an approved commercial off-site plant. Conform to ASTM C 94, except materials, testing, and mix designs as specified herein. Use transit mixer trucks equipped with automatic devices for recording number of revolutions of drum. Comply with CBC Section, 1905.

B. Admixtures: All approved admixtures shall be introduced into the concrete at the batch plant. Field additions are not acceptable.

C. Slump: Adjust quantity of water so concrete at point and time of placing does not exceed the slumps per plans when tested according to ASTM C143. Use the minimum water necessary for workability required by part of structure being cast.

D. For compressive strength, density, fly ash content, slump, and water-cement ratio, refer to the general notes in the plans.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 GENERAL

A. Time of Placing: Do not place concrete until reinforcement, conduits, outlet boxes, anchors, hangers, sleeves, bolts, and other embedded materials are securely fastened in place. Contact the inspector at least 24 hours before placing concrete; do not place concrete until inspected by the inspector.

B. Pouring Record: A record shall be kept on the Project site of time and date of placing concrete in each portion of structure. Such record shall be maintained on the Project site until Substantial Completion and shall be available for examination by the SEOR.

3.03 PREPARATION

A. Earth Subgrade: Dampen 24 hours before placing concrete, but do not muddy. Re-roll where necessary for smoothness and remove loose material.

B. Verify that forms are clean and free of rust before applying release agent.

C. Reglets and Rebates:
   1. Form reglets and rebates in concrete to receive flashing, frames and other equipment as detailed and required. Coordinate dimensions and locations required with other related Work.
   2. If concrete slabs on grade adjoin a wall or other perpendicular concrete surface, form a reglet in wall to receive and carry horizontal concrete Work. Reglet shall be full thickness of the slab and shall be 3/4 inch wide, unless otherwise indicated. Requirement does not apply to exterior walks, unless specifically indicated.

D. Screeds: Install screeds accurately and maintain at required grade or slab elevations after steel reinforcement has been installed , but before starting to place concrete. Install screeds adjacent to walls and in parallel rows not to exceed 8 feet on centers.

E. Screeds Over Vapor Barrier: Use weighted pad or cradle type screeds and do not drive stakes through the vapor barrier. Check with an instrument level, transit, or laser.

F. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

G. Remove all free water from forms before concrete is deposited. Remove hardened concrete, debris, and foreign materials from interior surfaces of forms, exposed reinforcing, and from surfaces of mixing and conveying equipment.

H. Wetting: Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce absorption and to help maintain concrete workability.

I. Gravel Fill: Recompact disturbed gravel and bring to correct elevation.

J. Sand Beds or Subslab Drainage Fill: Recompact disturbed material and bring to correct elevation.

K. All concrete shall be thoroughly consolidated by suitable means during placement and shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms.

L. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.04 PLACING CONCRETE

A. Sheet Vapor Retarders:
   1. Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer’s written instructions.
   2. Lap joints 6 inches and seal with manufacturer’s recommended adhesive or tape.

B. Conveying and Placing:
   1. Place concrete in accordance with ACI 304R.
   2. Do not place concrete until reinforcing steel and forms or decks have been approved by the Inspector and other authorities having jurisdiction. Concrete shall be placed only under direct observation of the inspector. Do not place concrete outside of regular working hours, unless the inspector has been notified at least 48 hours in advance.
   3. Comply with CBC Sections 1905.9 and 1905.10.
   4. Concrete shall be conveyed from mixer to location of final placement by methods, which will prevent separation or loss of materials. Place concrete in horizontal layers not more than 18" thick within 90 minutes after water is first added to the batch.
   5. In placing concrete in columns, walls or thin sections, provide openings in forms, elephant trunks, tremies or other recognized devices, to prevent segregation and accumulation of partially hydrated concrete on forms or metal reinforcement above level of concrete being placed. Such devices shall be installed so that concrete will be dropped vertically. Unconfined vertical drop of concrete from end of such devices to final placement surface shall not exceed 5-feet for concealed concrete or over 3-feet for exposed concrete.
   6. Concrete shall be placed as a continuous operation until placing of panel or section is completed. Top surfaces of vertically formed lifts shall be level.
   7. Concrete shall be thoroughly consolidated during placement, and shall be worked around reinforcement and embedded fixtures with mechanical vibrators.
   8. Where new concrete is placed against or on old or existing concrete, apply bonding agent to surface of old concrete prior to placement of new concrete.

C. Compaction and Screeding:
   1. Compacting: Compact each layer of the concrete as placed with mechanical vibrators or equivalent equipment. Transmit vibration directly to concrete and in no case through the forms unless approved. Accomplish thorough compaction. Supplement by rodding or spading by hand adjacent to forms. Compact concrete into corners and angles of forms and around reinforcement and embedded fixtures. Recompact deep sections with congestion due to reinforcing steel as required.
   2. Operation of Vibrators: Do not horizontally transport concrete in forms with vibrators nor allow vibrators to contact forms or reinforcing. Push vibrators vertically into the preceding layers that are still plastic and slowly withdraw, producing maximum obtainable density in concrete without creating voids or segregation. In no case disturb concrete that has partially set. Vibrate at intervals not exceeding two-thirds the effective visible vibration diameter of the submerged vibrator. Avoid excessive vibration that causes segregation.
   3. Tamp freshly placed concrete with a heavy tamper until at least 3/8 inch of mortar is brought to surface. Concrete shall then be tamped with a light tamper and screeded with a heavy straightedge until depressions and irregularities are eliminated, and surface is true to finish grades or elevations. Remove excess water and debris.
   4. Where slabs are to receive separate cement finish or mortar setting bed, continued tamping to raise mortar to surface is not performed. Laitance shall be removed by brushing with a stiff brush or by light sandblasting to expose clean top surface of coarse aggregate.

D. Floating and Troweling:
   1. After concrete has been placed, struck off, consolidated, and restraightened, concrete shall not be worked further until ready for floating. Restraightening operation is best accomplished by use of 8 foot to 10 foot wide bull float. Power floating operations shall begin when the water sheen has disappeared, and when the mix has stiffened sufficiently

to permit proper operation of power-driven float.

2. Consolidate surface with power-driven floats. Hand floating with wood or cork faced floats shall be used in locations inaccessible to power driven machine. Surface shall be restraightened at this stage with ten foot highway straightedge applied at not less than two different angles.
3. High spots shall be cut down and low spots filled during this procedure to produce planes checking true under straightedge in any direction. Uniformly slope surfaces to drains where occurs.
4. Restraightening operation shall be followed by final float pass to uniform, smooth, granular texture.

E. Joints: Comply with CBC Section 1906.4. Locate joints in concrete only where shown or approved and obtain prior approval for points of stoppage of any pour. Clean and roughen surface of construction joints by removing entire surface and exposing 1/4" of clean coarse aggregate solidly embedded in mortar matrix by chipping, use of an approved retarder agent, or equal. Water and keep hardened concrete wet for not less than 24 hours before placing the next lift or abutting concrete. Cover the horizontal surfaces of existing or previously placed and hardened concrete with a 2" thick layer of fresh concrete of required mix less 50 percent of coarse aggregate just before balance of concrete is placed.

F. Vertical Elements: Stop placement of concrete in walls and columns 1 1/2" below bottom of beams or supported slabs. Stop placement at sills and heads of wall openings in the same manner. Allow concrete in vertical elements to be in place at least 2 hours and until vertical settlement has ceased before placing concrete for floor framing.

G. Correction of Segregation: Before placing next layer of concrete, and at the top of each placement for vertical elements, remove all concrete containing excess water or fine aggregate, or showing deficiency of coarse aggregate, and fill the space with compacted concrete of correct proportions. Comply with CBC Section, 1906.4.

H. Filling, Leveling and Patching:
   1. Concrete slabs exhibiting high or low spots and indicated to receive resilient floor covering or soft floor covering, shall have surfaces repaired. High spots shall be honed, or ground with power-driven machines to required tolerances. Low spots shall be filled with latex underlayment, installed in strict accordance with manufacturer's written recommendations.
   2. Holes resulting from form ties or sleeve nuts shall be solidly packed, through exterior walls, by pressure grouting with cement grout, as specified. Grouted holes on exposed surfaces shall be screeded flush and finished to match adjoining surfaces.

I. Cement Base: Cement base shall be of the height, thickness, and shape detailed. Base shall be reinforced with one inch mesh, 18 gage, zinc-coated wire fabric. Base finish mixture shall be one part Portland cement, 2 parts of fine aggregate and one part pea gravel. Colored cement base shall include a chemically inert mineral oxide pigment in the mix.

J. Place concrete for floor slabs in accordance with ACI 302.1R.

K. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 EXPANSION AND CONSTRUCTION JOINTS

A. EXPANSION AND CONSTRUCTION JOINTS
   1. Construction Joints: Details and proposed location of construction joints shall be as indicated on the Drawings, located to least impair strength of structure, in accordance with the following:
      a. Thoroughly clean contact surface by sand blasting entire surface not earlier than 5 days after initial placement.
      b. A mix containing same proportion of sand and cement provided in concrete plus a maximum of 50 percent of coarse aggregate shall be placed to a depth of at least one inch on horizontal joints. Vertical joints shall be wetted and coated with a neat cement grout immediately before placing of new concrete.
      c. Should contact surface become coated with earth, sawdust, or deleterious material of any kind after being cleaned, entire surface shall be re-cleaned before applying mix.
   2. Expansion Joints: Provide expansion joints where indicated in walks and exterior slabs. Space approximately 20 feet apart, unless otherwise indicated. Joints shall extend entirely through slab with joint filler in one piece for width of walk or slab.
   3. Tooled Joints: Slabs, walks and paving shall be marked into areas as indicated with markings made with a V-grooving tool. Marks shall be round-edged, free from burrs or obstructions, with clean cut angles and shall be straight and true. Walks, if not indicated, shall be marked off into rectangles of not more than 12 square feet and shall have a center marking where more than 5 feet wide.

3.06 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.07 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:
   1. Under Seamless Resilient Flooring: 1/8 inch in 10 feet.
   2. Under Carpeting: 1/4 inch in 10 feet.
   3. Under Wood Sports Flooring: 1/8" in 10 feet.

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.08 CONCRETE FINISHING

A. Soda and Acid Wash: Concrete surfaces to receive plaster, paint or other finish, and which have been formed by oil coated forms, shall be scrubbed with a solution of 1-1/2 pounds of

caustic soda to one gallon of water. Surfaces where smooth wood or waste molds have been furnished shall be scrubbed with a solution of 20 percent muriatic acid. Wash with clean water after scrubbing.

B. Sacking: Exposed concrete curbs, and other similar surfaces shall be sacked by an application of Portland cement grout, floated, and rubbed. Sacking shall not be performed until patching and filling of holes has been completed. Entire sacking operation for any continuous area shall be started and completed within the same day.
   1. Mix one part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having consistency of thick paint. Wet surface of concrete sufficiently to prevent absorption of water from grout. Apply grout uniformly with a brush or spray gun, then immediately float surface with a cork or other suitable float, scouring wall vigorously.
   2. While grout is still plastic, finish surface with a sponge-rubber float, removing excess grout. Allow surface to dry thoroughly, then rub vigorously with dry burlap to completely remove dried grout. No visible film or grout shall remain after rubbing with burlap.

C. Exposed Formed Concrete: Rub surfaces with a carborundum brick or equal until smooth and free of form marks, offsets, and other defects, and in uniform planes. Wet rubbed surface and then brush coat with cement grout consisting of 1 part light-colored Portland cement to 2 parts fine aggregate and mixed with water to the consistency of thick paint. Cork or wood float grout to fill all pits, air bubbles, and surface holes. Scrape off excess grout and rub surface with burlap or equal to remove all grout film. After grout sets, again coat with same grout, cure, then brick and burlap rub as necessary to eliminate remaining defects and blemishes, and damp cure surfaces for not less than 3 days or longer if required for complete curing of concrete. Finish, clean, and cure each surface as a continuous operation. Produce uniformly plane smooth surfaces free of grout film, grout or rubbing marks, defects, or blemishes after painting or covering with a flexible type finish material. Unless otherwise indicated or specified, apply this finish on exposed formed concrete, exposed concrete at the building foundation, and where indicated or scheduled.

D. Sandblasting: Exterior concrete surfaces to receive stucco dash coat finish, where plywood or other smooth forms have been furnished, shall be uniformly sand-blasted with sharp quartz sand under sufficient air pressure to remove dirt, form oil and other foreign materials, and roughen surface to provide a proper bond. Such surfaces shall be thoroughly washed with clean water after sandblasting.

E. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

3.09 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. All curing shall be per CBC Section 1905.11. Keep forms containing concrete in a wet condition until removed. Keep concrete continuously moist for not less than 7 days after placement. Keep concrete above 50ºF and moist with a fine fog water spray until protected by

curing media.

D. Forms containing concrete, top of concrete between forms, and exposed concrete surfaces after removal of forms shall be maintained in a thoroughly wet condition for at least 7 consecutive days after placing. Use the water curing method, curing sheet material, or a clear liquid membrane-forming curing compound except as otherwise specified.

E. During times of dry or excessive winds, high ambient temperature, low humidity, or other ambient conditions causing rapid drying, use specified evaporation retardant and finishing aid material according to the manufacturers instructions and cure concrete with a fine fog spray of water, or equal, applied both during and after finishing and continued until final curing operations are started.

F. Within 24 hours after finishing, exterior slabs and paving, and interior slabs to receive cement topping or mortar setting beds, shall be covered with sand to a depth of 2 inches and kept thoroughly wet for 7 days.
   1. Instead of sand covering, exterior walks and paving where no other surface treatment is specified, may be cured with clear liquid curing compound immediately installed in accordance with manufacturer's directions.

G. Where fly ash replacement is 20% or higher, floor slabs shall receive a 3 day moist cure and then 1 coat of approved curing compound. All other surfaces, with the exception of foundations, shall receive a coat of approved curing compound immediately after removal of formwork.

H. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Final Curing: Begin after initial curing but before surface is dry.

3.10 GROUTING AND DRYPACKING

A. Install as indicated or required. Where grouting and drypacking is part of the work of other sections, it shall conform to the following requirements, as applicable.

B. Drypacking: Mix materials thoroughly with minimum amount of water. Install drypack by forcing and rodding to fill voids and provide complete bearing under plates. Finish exposed surfaces smooth and cure with damp burlap or liquid curing compound.

C. Non-Shrink Grouting:
   1. Mixing: Mix the approved non-shrink grout material with sufficient water per manufacturers recommendations.
   2. Application: Surfaces to receive the non-shrink grout shall be clean, and shall be moistened thoroughly immediately before placing the mortar. Before grouting, surfaces to be in contact shall be roughened and cleaned thoroughly, all loose particles shall be removed and the surface flushed thoroughly with neat cement grout immediately before the grouting mortar is placed. Place fluid grout from one side only and puddle, chain, or pump for complete filling of voids; do not remove the dams or forms until grout attains initial set. Finish exposed surfaces smooth, and cure as recommended by grout manufacturer.

3.11 FIELD QUALITY CONTROL

A. Comply with pertinent provisions of Section 014000: Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Testing/Evaluation of Concrete: Conform to CBC and ACI. Testing Laboratory shall perform following tests. Samples for testing shall be obtained in accordance with ASTM C 172, and shall be taken from as close to point of placement as possible.
   1. Compressive Strength Tests: Cast one set of three or more cylinders from each days placing and each 50 cubic yards, or fraction thereof, or not less than once for each 2,000 square feet of surface area for slabs and walls, of each strength of structural concrete. Date cylinders, assign record number, and tag showing the location from which sample was taken. Also record slump test result of sample. Do not make more than two series of tests from any one location or batch of concrete.
   2. Test Cylinders: Samples will be made in accordance with ASTM C172. Cast cylinders according to ASTM C31; 24 hours later, store cylinders under moist curing conditions at about 70 F. Test according to ASTM C39 at 7 and 28 day ages. The remaining cylinder shall be kept in reserve in case tests are unsatisfactory.

D. Core Tests: Comply with CBC and ACI. If tests show that compressive strength of any concrete falls below required minimum at 28 day age, additional curing and testing of concrete which unsatisfactory test reports represent may be directed. Testing Laboratory shall take and test drilled cores as directed in accordance with ASTM C42. Contractor shall refill core holes with drypack concrete of the same compressive strength required for cored concrete. If core tests results are unsatisfactory, Contractor shall furnish required labor, equipment, and weights, and the Testing Laboratory shall conduct load testing on involved parts of building or structure as directed. Contractor shall bear additional curing and test costs, including Testing Laboratory costs, for concrete not meeting required compressive strength at 28 day age even if testing demonstrates that concrete has eventually attained required minimum compressive strength, and all costs for required corrections or removals and replacements as directed and required for approved construction.

E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

G. Slab Testing: Cooperate with manufacturer of specified moisture vapor reducing admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.

3.12 CLEAN UP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.13 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

This page intentionally left blank

Section 03 3511
Concrete Floor Finishes

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface treatments for concrete floors and slabs.

B. Liquid densifiers and hardeners.

C. Dry shake hardeners.

D. Concrete stains and dyes.

E. Clear penetrating sealers.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.03 REFERENCE STANDARDS

A. ACI 301 - Specifications for Concrete Construction; 2020.

B. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.

C. ANSI A326.3 - American National Standard Test Method for Measuring Dynamic Coefficient of Friction of Hard Surface Flooring Materials; 2017.

D. ASME B46.1 - Surface Texture (Surface Roughness, Waviness, and Lay); 2009.

E. ASTM F2508 - Standard Practice for Validation, Calibration, and Certification of Walkway Tribometers Using Reference Surfaces; 2016.

F. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 1996 (Reapproved 2008).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with concrete floor placement and concrete floor curing.

B. Preinstallation Meeting: Convene a pre-installation meeting with relevant parties.

1.05 SUBMITTALS

A. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.

B. Concrete Floor Protection Plan: Contractor shall provide a concrete floor protection plan.

C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

D. Specimen Warranty: Manufacturer warranty.

E. Provide letter of certification from concrete floor finish manufacturer for polished concrete system stating that the installer is a certified applicator of the polished concrete system and is familiar with proper procedures and installation requirements required by the manufacturer.

F. Provide copy of tribometer testing and validation reports per ASTM F2508

1.06 QUALITY ASSURANCE

A. Perform work in accordance with ACI 302.1R.

B. Installer Qualifications:
   1. Use an experienced installer and adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.
   2. The special concrete finish manufacturer shall certify applicator.
   3. Applicator shall be familiar with the specified requirements and the methods needed for proper performance of work of this section.

C. Concrete floor finishing sub-contractor to attend pre-installation meeting with concrete placement sub-contractor at least 1 week prior to placement of concrete. Architect and manufacturer's representative to attend pre-installation meeting with sub-contractors.
   1. Finishing sub-contractor to review installation techniques for mock up and final floor slab with manufacturer.
   2. Sub-contractors to review concrete mix design for compatibility with approved floor finish materials.

1.07 MOCK-UP

A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.

B. Mock-Up Size: Minimum 15 feet square for each specified finish and color.

C. Locate where directed by Owner and Architect.

D. If the Architect or Owner Representative determines that mock-ups do not meet requirements, demolish and remove them from the siteand cast other until mock-ups are approved.

E. Apprroved mock up to remain onsite until placement concrete slab.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.09 PROTECTION

A. No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential.
   1. All hydraulic powered equipment must be diapered to avoid staining of the concrete.
   2. No trade will park vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.
   3. No pipe cutting machine will be used on the inside floor slab.
   4. Steel will not be placed on interior slab to avoid rust staining.
   5. Acids and acidic detergents will not come into contact with slab.
   6. All trades are to be informed that the slab must be protected at all times.

B. Concrete Floor Protection Plan: Concrete floor finish Subcontractor shall assist Contractor in development of Concrete Floor Protection Plan (CFPP). Plan to include
   1. Signage to communicate with subcontractors protection requirements. (Available from ASCC as free download)
   2. Concrete floor protection materials and placement
   3. Plans for maintenance of protection materials

1.10 FIELD CONDITIONS

A. Comply with manufacturers written instructions for cure time, substrate temperature and moisture content, ambietn temperature and humidity, ventilation adn other conditions affecting topping performance.

B. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.

C. Maintain ambient temperature of 50 degrees F minimum or as recommended by the manufacturer.

1.11 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Finish Warranty: Provide 10-year manufacturer warranty against excessive degradation of finish and that it will remained hardened, dustproof, and water repellent.

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS

A. Liquid Densifier and Hardener:
   1. Use at following locations: Plumbing Chase and Kiosk.

B. Dry Shake Hardener:
   1. Use at following locations: Restrooms.

C. Clear Coating:
   1. Use at following locations: Restroom.

2.02 DENSIFIERS AND HARDENERS AND SEALERS

A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores, hardening, and dustproofing.
   1. Products:
      a. Ashford Formula; Curecrete Distribution, Inc.: www.ashfordformula.com
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Dry Shake Hardener: Premixed dry powder for spreading on and working into concrete surface prior to set.
   1. Color(s): As selected by Architect from manufacturer's custom range.
   2. Color(s):
      a. Base Color: 100% Coverage: Arizona Tan A-53
      b. Accent Color: 33% Coverage. Broadcasted over base color for mottled, flashed look: Terra Cotta A-26
   3. Composition: Non-metallic aggregate.
      a. Products:
         1) Sika Color; LITHOCHROME Color Hardener: www.scofield.com/#sle.
         2) Substitutions: See Section 01 6000 - Product Requirements.

2.03 COATINGS

A. Penetrating Sealer: Transparent, nonyellowing, water- or solvent-based coating.
   1. Composition: Silane-siloxane mixture.
      a. Products: From same manufacturer as dry shake hardener
         1) Sika Corporation; SikaCem-102 First Seal: https://usa.sika.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

C. Concrete must be in place a minimum of 45 days or as directed by the manufacturer before application can begin.

D. Meeting with concrete installer.

E. Letter to contractor and owner idenitfying areas formed not meeting required tolerances for installation.

3.02 TOLERANCES

A. Measure for F(F) and F(L) tolerances for floors in accordance with ASTM E1155, within 48 hours after slab installation.

B. Finish concrete to achieve the following tolerances. Where sloping to a drain, omit level criteria.
   1. Exposed to view without additional finishing: Ff 30 and Fl 20.
   2. Exposed to view with concrete polishing system applied: Ff 40 and Fl 30.

C. Correct the slab surface if tolerances are less than specificed.

D. Correct defects by grinding or by removal and replacement of the defectivve work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.03 GENERAL

A. Apply materials in accordance with manufacturer's instructions.

3.04 FLOOR FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1R.

B. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains at 1/8 inch per foot nominal. No slope shall exceed 1/4 per foot.

C. Densifer Applicaion
   1. Clean floor in accordance with manifacturure's recommendations.
   2. Apply densification in acordance with manufacturer's recommendations over broom finished concrete slab.
   3. Remove excess after 45 minutes or in accordance with manufacturer's recommendations.

D. Dry Shake Hardener Applicaiton
   1. Apply base color and work into concrete surface.
   2. Allow adequate time for base color to cure to ensure no over-bleed of accent color.
   3. Broadcast accent color for "flashed" finish along with additional base color if required and work into concrete surface. Trowel to create mottled amorphic color finish.
   4. Broom finish concrete to achieve slip resistance
   5. Apply penetraiting sealer per manufacturer's recommendations.

E. Slip Resistance:
   1. Minimum wet dynamic coeficient of friction: 0.42 when measured per ANSI A326.3
   2. Minimum floor roughness of 0.41 micrometers (16 micro inches) when measured per ASME B46.1

3.05 COATING APPLICATION

A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.

B. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

3.06 PROTECTION

A. Protect finished work until fully cured in accordance with manufacturers recommendations.

B. Protect finished work for the duration of construction.

END OF SECTION

Section 04 2000
Unit Masonry

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Concrete facing brick.

C. Mortar and grout.

D. Installation of Reinforcement

E. Placement of anchor bolts, assemblies and embeds

F. Grouting of plates and embeds

G. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 2000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.

B. Section 03 3000 - Cast-in-Place Concrete: Installation of dovetail slots for masonry anchors.

C. Section 04 0511 - Masonry Mortaring and Grouting.

D. Section 05 5000 - Metal Fabrications: Loose steel lintels.

E. Section 07 6200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.

F. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

A. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.

B. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.

C. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

D. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.

E. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

F. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

G. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

H. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

I. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.

J. ASTN C1019 - Standard Test Method for Sampling and Testing Grout, 2016

K. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2014.

L. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Mix Designs and test results:
   1. One of the following for each mortar mix
      a. Mix designs indicating type and proportions of ingredients in compliance with the proportion specification of ASTM C270, or
      b. Mix designs and mortar tests performed in accordance with the property specification of ASTM C270
   2. One of the following for each grout mix
      a. Mix designs indicating type and proportions of ingredients in compliance with the proportion specification of ASTM C476, or
      b. Mix designs and grout strength tests performed in accordance with the property specification of ASTM C476, or
      c. Compressive strength tests performed in accordance with ASTM C1019, and slump flow and Visual Stability Index (VSI) as determined by ASTM C1611/C1611M.

C. Material Certificates- Material certificates for the following, certifying that each material is in compliance.
   1. Reinforcement
      a. Refer to Section 03 2000 Concrete Reinforcement
   2. Anchors, ties, fasteners, and metal accessories
   3. Masonry Units
   4. Mortar and grout materials
   5. Self-Consolidating grout

D. Construction Procedures
   1. Cold weather construction procedures
   2. Hot weather construction procedures

E. Samples: Submit two samples of decorative block units to illustrate color, texture, and extremes of color range.

F. Samples of cured dry mortar showing finish color.

G. Cured sealant colors for control joints.

H. Control Joint Filler, 12" pieces of each size and type.

1.05 QUALITY ASSURANCE

A. Comply with the pertinent provisions of 01 4000 "Quality Requirements."

B. Comply with provisions of the following codes and standards except where exceeded by requirements of the contract documents.
   1. California Building Code (CBC), 2016
   2. ACI 530/530.1/ERTA, Building Code Requirements for Masonry Structures, 2013

C. Inspections:
   1. General: Structural verifications inspections and test shall be performed in accordance with the following codes and standards:
      a. California Building Code (CBC), 2016
      b. ACI 530/530.1/ERTA, Building Code Requirements for Masonry Structures, 2013
   2. Owner Requirements:
      a. The owner or owner's agent shall employ one or more approved agencies to perform inspections during construction as required by code and shown in the contract documents and specifications
   3. Special Inspection
      a. Qualifications: The special inspector(s) shall provide written documentation to the building official demonstrating his or her competence and relevant experience or training. The experience or training shall be considered relevant when the documented experience or training is related in complexity to the same type of special inspection activities for projects of similar complexity and material quantities.
      b. Special Inspection Report Requirements
         1) The special inspector shall keep record of inspections
         2) The special inspector shall furnish inspection reports to the building official and to the Architect and Engineer of Record.
         3) Reports shall indicate that work inspected was or was not completed in conformance to approved construction documents.
         4) Discrepancies shall be brought to the immediate attention of the contractor for correction
         5) If not corrected discrepancies shall be brought to the attention of the building official, and the Architect and Engineer of Record prior to completion of that phase of work.
         6) A final report documenting the special inspections and correction of any discrepancies noted shall be submitted to the building official.
   4. Contractor Requirements
      a. Special inspection is in addition to the contractor's quality control inspections and testing. The contractor's quality control inspections and testing shall occur prior to special inspection and reports shall be available to the special inspector.
      b. The contractor will notify, in writing, the owner or owner's agent at least 48 hours in advance of special inspection required.

c. The contractor shall ensure that the work for which special inspection is required remains accessible and exposed for special inspection purposes until completion of the required special inspection.
d. Any contractor responsible for the construction of the main wind and/or seismic force resisting system shall submit a written statement of responsibility to the building official and owner prior to commencement of work on the system or component. The statement of responsibility shall contain acknowledgement and awareness of the special inspection requirements.

5. Inspections Required per TMS 602-13/ACI 530.1/ASCE 6-13:

Level C Quality Assurance				
MINIMUM TESTS				
Verification of f', and f'AAC in accordance with Article 1.4B prior to construction and for every 5,000 sq. ft. during construction. *(see Section a below)*				
Verification of proportions of materials in premixed or preblended mortar and grout other than self-consolidating grout as delivered to the project site.				
Verification of slump flow and visual stability Index (VSI) as delivered to the project site in accordance with Article 1.5 B.1.b.3 for self-consolidating grout				
MINIMUM SPECIAL INSPECTION				
Inspection Task	**Frequency**		**Reference for Criteria**	
	Cont.	Periodic	TMS402/ ACI 530/ ASCE 5	TMS402/ ACI 530.1/ ASCE 6
1. Verify Compliance with the approved submittals		X		Art. 1.5
2. Verify that the following are in compliance:				
a. Proportions of site-mixed mortar, grout		X		Art. 2.1, 2.6A, 2.6B, 2.6C, 2.4G.1.b
b. Grade, type and size of reinforcement and anchor bolts		X	Sec. 6.1	Art. 2.4, 3.4
c. Placement of masonry units and construction of mortar joints		X		Art. 3.3B
d. Placement of reinforcement, connectors	X		Sec. 6.1, 6.2.1, 6.2.6, 6.2.7	Art. 3.2E, 3.4, 3.6A
e. Grout space prior to grouting	X			Art. 3.2D, 3.2F
f. Placement of grout	X			Art. 3.5, 3.6C

g. Size and location of structural elements		X		Art. 3.3F
h. Type, size, and location of anchors including other details of anchorage of masonry to structural members, frames and other construction	X		Sec. 1.2.1(e), 6.1.4.3, 6.2.1	
i. Welding of reinforcement	X		Sec. 8.1.6.7.2, 9.3.3.4(c), 11.3.3.4(b)	
j. Preparation, construction, and protection of masonry during cold weather (temperature below 40 degrees F) or hot weather (temperature above 90 degrees F)		X		Art. 1.8C, 1.8D
3. Observe Preparation of grout specimens, and/or prisms	X			Art. 1.4, B.2.a.3, 1.4 B.2.b.3, 1.4 B.2.c.3, 1.4 B.3, 1.4 B.4

a. Masonry compressive strength shall be determined for each wythe by the unit strength method or by the prism method *(Reference the Specification for Masonry Structures (TMS 602-13/ACI 530.1-13/ASCE 6-13 Art. 1.4)*
   1) Unit Strength Method *(Reference the Specification for Masonry Structures (TMS 602-13/ACI 530.1-13/ASCE 6-13 Art. 1.4B.2)*
      (a) Units are to be sampled and tested to very conformance with ASTM C90.
      (b) Thickness of the bed joint shall not exceed 5/8".
      (c) For grouted masonry the grout shall conform to TMS 602-13/ACI 530.1-13/ASCE 6-13 Art. 2.2.
   2) Prism Test Method: Determine the compressive strength of concrete masonry by the prism test method in accordance with ASTM C1314.

1.06 MOCK-UPs

A. Sample panels
   1. Construct sample panels of masonry walls.
      a. Use materials and procedures accepted for the work
      b. The minimum sample panel dimensions are 4 feet by 4 feet.
      c. The acceptable standard for the work is established by the accepted panel
      d. Retain sample panels at the project site until work has been accepted.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Do not use damaged masonry units, damaged components of structure, damaged packaged materials,

C. Protect cementitious materials for mortar and grout from precipitation and groundwater

D. Do not use masonry materials that are contaminated

E. Store different aggregates separately

F. Protect reinforcement, ties and metal accessories from permanent distortions and store them off the ground.

1.08 PROJECT CONDITIONS

A. Construction Loads - Do not apply construction loads that exceed the safe superimposed load capacity of the masonry and shores, if used.

B. Masonry Protection - Cover top of unfinished masonry work to protect it from moisture intrusion

C. Hot Weather Construction - Implement approved hot weather procedures and comply with the following:
   1. Preparation When the ambient air temperature exceeds 100 degrees F, or exceeds 90 degrees F with a wind velocity greater than 8 mph:
      a. Preparation When the ambient air temperature exceeds 100 degrees F, or exceeds 90 degrees F with a wind velocity greater than 8 mph:
         1) Maintain sand piles in a damp, loose condition
         2) Provide necessary conditions and equipment to produce mortar having a temperature below 120°F
   2. Construction — While masonry work is in progress
      a. When the ambient air temperature exceeds 100°F, or exceeds 90°F with a wind velocity greater than 8 mph:
         1) Maintain temperature of mortar and grout below 120°F.
         2) Flush mixer, mortar transport container, and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
         3) Maintain mortar consistency by retempering with cool water.
         4) Use mortar within 2 hr of initial mixing.
   3. Protection — When the mean daily temperature exceeds 100°F or exceeds 90°F with a wind velocity greater than 8 mph, fog spray all newly constructed masonry until damp, at least three times a day until the masonry is three days old.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:

1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
2. Load-Bearing Units: ASTM C90, medium weight.
   a. Hollow block, as indicated.

2.02 MORTAR AND GROUT MATERIALS

A. Mortar
   1. Provide mortar conforming to the following parameters
      a. Conform to ASTM C270
      b. Comply with Section 2103.2 of the 2016 CBC
      c. Type S Mortar
      d. 1,800 psi minimum 28 day compressive strength

B. Grout
   1. Provide grout conforming to the following parameters
      a. Conform to ASTM C476
      b. Comply with Section 2103.3 of the 2016 CBC
      c. 2,000 psi minimum 28 day compressive strength. Determine compressive strength of grout in accordance with ASTM C1019.
      d. Do not use admixtures unless accepted by the Engineer of Record. Field addition of admixtures is not permitted in self-consolidating grout.

C. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
   1. Hydrated Lime: ASTM C207, Type S.
   2. Grout Aggregate: ASTM C404.

D. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.

2.03 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: Type specified in Section 03 2000; size as indicated on drawings; uncoated finish.

2.04 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints. See Project Plans for additional control joint requirements.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.

C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.05 MORTAR AND GROUT MIXING

A. Mortar
   1. Mix cementitious materials and aggregates between 3 and 5 minutes in a mechanical batch mixer with a sufficient amount of water to produce a workable consistency. Do not hand

mix mortar. Maintain workability of mortar by remixing or retempering. Discard mortar which has begun to stiffen or is not used within 2-1/2 hours after initial mixing.

2. Limit the weight of mineral oxide or carbon black pigments added to project-site prepared mortar to the following maximum percentages by weight of cement:
   a. Pigmented portland cement-lime mortar
      1) Mineral oxide pigment = 10 percent
      2) Carbon black pigment = 2 percent
   b. Pigmented mortar cement mortar
      1) Mineral oxide pigment = 5 percent
      2) Carbon black pigment = 1 percent
   c. Pigmented masonry cement mortar
      1) Mineral oxide pigment = 5 percent
      2) Carbon black pigment = 1 percent

      Do not add mineral oxide or carbon black pigment to preblended colored mortar or colored cement.
3. Do not use admixtures containing more than 0.2 percent chloride ions

B. Grout
   1. Except for self-consolidating grout, mix grout in accordance with the requirements of ASTM C476.
   2. Unless otherwise required, mix grout other than self-consolidating grout to a consistency that has a slump between 8 and 11 inches.
   3. Proportioning of self-consolidating grout at the project site is not permitted. Do not add water at the project site except in accordance with the self-consolidating grout manufacturer's recommendations.

C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.
   1. Include verification that foundations are constructed within a level alignment tolerance of +/- 1/2 inch.

B. Verify that related items provided under other sections are properly sized and located.
   1. Include verification that reinforcing dowels are positioned in accordance with the project drawings.

C. If stated conditions are not met notify the Architect and Engineer of Record.

3.02 PREPARATION

A. Clean reinforcement and shanks of anchor bolts by removing mud, oil, or other materials that will adversely affect or reduce bond at the time mortar or grout is placed. Reinforcement with rust, mill scale, or both are acceptable without cleaning or brushing provided that the dimensions, of a cleaned sample are not less than required by the ASTM specification

governing the reinforcement.

B. Prior to placing masonry, remove laitance, loose aggregate, and anything else that would prevent mortar from bonding to the foundation.

C. Wetting Masonry units
   1. Concrete Masonry - Unless otherwise required, do not wet concrete masonry before laying. Wet cutting is permitted.

D. Debris - Construct grout spaces free of mortar dropping, debris, loose aggregates, and any material deleterious to masonry grout.

E. Reinforcement - Place reinforcement and ties in grout spaces prior to grouting

F. Cleanouts - Provide cleanouts in the bottom course of masonry for each grout pour when grout pour exceeds 5 ft 4 in.
   1. Construct cleanouts so that the space to be grouted can be cleaned and inspected. In solid grouted masonry, space cleanout horizontally a maximum of 32 inches on center.
   2. Construct cleanouts with an opening of sufficient size to permit removal of debris. The minimum opening dimension shall be 3 in.
   3. After cleaning, close cleanouts with closures braced to resist grout pressure.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running. Unless Otherwise required on the drawings
   2. Coursing: One unit and one mortar joint to equal 8 inches.

3.05 PLACING AND BONDING

A. Placing mortar units
   1. Mortar joints at foundations - In the starting course on the foundations and other supporting members, construct bed joints so that the bed joint thickness is a least /1/4 inch and not more than:
      a. 1-1/4" when the first course of masonry is solid grouted and supported by a concrete foundation.
   2. Bed and head joints - Unless otherwise required construct 3/8 in thick bed and head joints except at foundation. Construct joints that also conform to the following
      a. Fill holes not specified in exposed and below grade masonry with mortar.
      b. Unless otherwise required, tool joint with a round jointer when the mortar is thumbprint hard.

c. Remove masonry protrusions extending 1/2 inch or more into cells or cavities to be grouted.

3. Hollow units - Place hollow units so:
   a. Face shells of bed joints are fully mortared
   b. Webs are fully mortared in:
      1) all courses of piers, columns and pilasters;
      2) when necessary to confine grout or insulation.
   c. Head joints are mortared, a minimum distance from each face equal to the face shell thickness of the unit.
   d. Vertical cells to be grouted are aligned and unobstructed openings for grout are provided in accordance with the project drawings.
4. Open units with beveled ends - Fully grout open-end units with beveled ends. Head joints of open-end units with beveled ends need not be mortared. At the beveled ends, form a grout key that permits grout within 5/8 inch of the face of the unit to prevent leakage of grout.
5. All Units
   a. Place clean units while the mortar is soft and plastic. Remove and re-lay in fresh mortar any unit disturbed to the extent that the initial bond is broken after initial positioning.
   b. Cut exposed edges or faces of masonry units smooth, or position so that exposed faces or edges are unaltered manufactured surfaces.
   c. When the bearing of a masonry wythe on its support is less than two-thirds of the wythe thickness, notify the Architect and Engineer of Record.

B. Embedded items an accessories - Install embedded items and accessories as follows:
   1. Construct chases as masonry units are laid
   2. Install pipes and conduits passing horizontally through masonry partitions.
   3. Place pipes and conduits passing horizontally through piers, pilasters, or columns
   4. Place horizontal pipes and conduits in and parallel to plane of walls
   5. Install secure connectors, flashing, weep holes, weep vents, nailing blocks, and other accessories.
   6. Install movement joints.
   7. Aluminum - Do not embed aluminum conduits pipes and accessories in masonry, grout or mortar unless they are effectively coated or isolated to prevent chemical reaction between aluminum and cement or electrolytic action between aluminum and steel.

C. Bracing of masonry - Design, provide and install bracing that will assure stability of masonry during construction.

D. Site tolerances - Erect masonry within the following tolerances from the specified dimensions.
   1. Dimension of elements
      a. In cross section or elevation (-1/4 in., +1/2 in.)
      b. Mortar joint thickness
         bed joints between masonry courses (+ 1/8 in)
         bed joint between flashing and masonry (-1/2 in., +1/8 in.)
         head (-1/4 in., +3/8 in.)
      c. Grout space or cavity width, except for masonry walls passing framed construction (-1/4 in., +3/8 in.)
   2. Elements
      a. Variation from level
         bed joints (+/- 1/4 in. in 10 ft, +/- 1/2 in. maximum)

top surface of load bearing walls (+/- 1/4 in. in 10 ft, +/- 1/2 in. maximum)
b. Variation from plumb (+/- 1/4 in. in 10 ft, +/- 3/8 in. in 20 ft,+/- 1/2 in. maximum)
c. True to a line (+/- 1/4 in. in 10 ft, +/- 3/8 in. in 20 ft,+/- 1/2 in. maximum)
d. Alignment of columns and walls (bottom versus top) (+/- 1/2 in. for load bearing walls and columns., +/- 3/4 in. for non-load bearing walls)

3. Location of elements
   a. Indicated in plan (+/- 1/2 in. in 20 ft, +/- 3/4 in. maximum)
   b. Indicated in elevation (+/- 1/4 in. in story height +/- 3/4 in. maximum)
   c. If the above conditions cannot be met due to previous construction, notify the Architect and Engineer of Record.
   d. Reinforcement, tie, and anchor installation

3.06 REINFORCEMENT, TIE AND ANCHOR INSTALLATION

A. Basic requirements - Place reinforcement, wall ties and anchors in accordance with the sizes, types, and locations indicated on the Project Drawings and as specified. Do not place dissimilar metals in contact with each other.

B. Reinforcement
   1. Support reinforcement to prevent displacement caused by construction loads or by placement of grout or mortar, beyond the allowable tolerances.
   2. Completely embed reinforcing bars in grout in accordance with the Section entititled grout placement.
   3. Maintain clear distance between reinforcing bards and the interior of masonry unity or formed surface of at least 1/4 inch for fine grout and 1/2 inch for coarse grout, except where cross webs of hollow units are used as supports for horizontal reinforcement.
   4. Place reinforcing bars maintining the following minimum cover:
      a. Masonry face exposed to earth or weather 2 in for bars larger than No. 5, 1-12/ in. for No. 5 bars or smaller.
      b. Masonry not exposed to earth or weather 1-1/2 in.
   5. Maintain minimum clear distance between parallel bars of the nominal bar size or 1 in., whichever is greater.
   6. In columns and pilasters, maintain minimum clear distance between vertical bars of one and one-half times the nominal bar size or 1-1/2 in., whichever is greater.
   7. Splice only where indicated on the Project Drawings, unless otherwise acceptable. When splicing by welding, provide welds in conformance with the provisions of AWS D1.4.
   8. Do not bend reinforcement after it is embedded in grout or mortar without approval from the Engineer of Record.
   9. Noncontact lap splices - Postion bars spliced by noncontact lap splices no farther apart transversely than one-fift the specified length of lap nor more than 8 in.
   10. Joint reinforcement
      a. Place joint reinforcement so that longitudinal wires are embedded in mortar with a minimum cover of 1/2 in. when not exposed to weather or earth; or 5/8 in. when exposed to weather or earth.
      b. Provide minimum 6 in. lap splice for joint reinforcement.
      c. Ensure that all ends of longitudinal wires of joint reinforcement at laps are embedded in mortar or grout.
   11. Placement tolerances
      a. Place reinforcing bars in walls and flexural elements within a tolerance of +/- 1/2 in. when the distance from the centerline of reinforcing bars to the opposite face of masonry, d, is equal to 8 in. or less, +/- 1in. for d equal to 24 in. or less but greater

than 8 in., and 1-1/4 in. for d greater than 24 in.

b. Place vertical bars within:
   1) 2 in. of the required location along the length of the wall when the wall segment length exceeds 24 in.
   2) 1 in. of the required location along the length of the wall when the wall segment length does not exceed 24 in
   3) If it is necessary to move bars more than one bar diameter or a distance exceeding the tolerance stated above to avoid interference with other reinforcing steel, conduits, or embedded items notify the Engineer of Record.
   4) Foundation dowels that interfere with unit webs are permitted to be be bent to a maximum of 1 in. horizontally for every 6 in. of vertical height.

C. Anchor bolts
   1. Embed headed and bent-bar anchor bolts larger than 1/4 in. diameter in grout that is placed in accordance with Section 3.06A and Section 3.06B. Anchor bolts of 1/4 in.diameter or less are permitted to be placed in grout or mortar bed joints that have a specified thickness of at least 1/2 in. thickness.
   2. For anchor bolts placed in the top of grouted cells and bond beams, maintain a clear distance between the bolt and the face of masonry unit of at least 1/4 in. when using fine grout and 1/2 in. when using coarse grout.
   3. For anchor bolts placed throught the face shell of a hollow masonry unit, drill a hole that is tight-fitting to the bolt or provide minimum clear distance that conforms to Section 3.05D.2 around the bolt and through the face of the shell. For the portion of the bolt that is within the grouted cell, maintain a clear distance between the bolt and the face of masonry unit and between the head or bent leg of the bolt and the formed surface of grout of at least 1/4 in. when using fine grout and at least 1/2 in when using coarse grout.
   4. Place anchor bolt with a clear distance between parallel anchor bolts not less than the nominal diameter of the anchor bolt, nor less than 1 in.

3.07 GROUT PLACEMENT

A. Placing time - Place grout wihin 1-1/2 hr from introducing water in the mixture and prior to initial set.
   1. Discard site-mixed grout that does not meet the specified slump without adding water after initial mixing.
   2. For ready-mixed grout:
      a. Addition of water is permitted at the time of discharge to adjust slump.
      b. Discard ready mixed grout that does not meet the specified slump without adding water, other than the water that was added at the time of discharge.
      The time limit is waived as long as the ready mixed grout meets the specified slump.

B. Confinement - Confine grout to the areas indicated on the project drawings. Use material to confine grout that permits bond between masonry units and mortar.

C. Grout pour height - Do not exceed the maximum grout pour height given in the Table below

Grout Type (1)	Maximum grout pour height, ft	Minimum clear width of grout space, in (2,3)	Minimum clear grout space dimensions for grouting cells of hollow units, in x in (3,4,5)
Fine	1	3/4	1-1/2x2
Fine	5.33	2	2x3

Fine	12.67	2-1/2	2-1/2x3
Fine	24	3	3x3
Coarse	1	3/4	1-1/2x3
Coarse	5.33	2	2-1/2x3
Coarse	12.67	2-1/2	3x3
Coarse	24	3	3x4

1. Fine and course grouts are defined by ASTM C476.
2. For grouting between masonry wythes.
3. Minimum clear width of grout space and minimum clear grout space dimension are the net dimension of the space determined by subtracting masonry protrusions and the diameters of horizontal bars from the as-built cross section of the grout space. Select grout type and maximum grout pour height based on minimum clear space.
4. Area of vertical reinforcement shall not exceed 6 percent of the area of the grout space.

D. Grout lift height
   1. For grout conforming to Section 2.02B
      a. Where the following conditions are met, place grout in lifts not exceeding 12 ft 8 in.
         1) The masonry has cured at least 4 hours
         2) The grout slump is maintained between 10 and 11 in.
         3) No intermediate reinforced bond beams are placed between the top and the bottom of the pour height
      b. When conditions 1 and 2 are met but there are intermediate bond beams within the grout pour, limit the grout lift height to the bottom of the lowest bond beam that is more than 5 ft. 4 in. above the bottom of the lift, but do not exceed a grout lift height of 12 ft. 8 in.
      c. When the conditions of 1 or 2 are not met, place grout in lifts not excedding 5 ft. 4 in.
   2. For self-consolidating grout conforming to Section 2.02B:
      a. When placed in masonry that has cured for at least 4 hours, place in lifts not exceeding the grout pour height.
      b. When placed in masonry that has not cured for at least 4 hours, place in lifts not exceeding 5 ft. 4 in. or the grout pour height, whichever is less.

E. Consolidation
   1. Consolidate grout at the time of placement.
      a. Consolidate grout pours 12 in. or less in height by mechanical vibration or by puddling.
      b. Consolidate pours exceeding 12 in in height by mechanical vibration, and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.
   2. Consolidation or reconsolidation is note required for self-consolidating grout.

F. Grout key - When grouting, form grout keys between grout pours. Form grout keys between grout lifts when the first lift is permitted to set prior to placement of the subsequent lift.
   1. Form a grout key by terminating the grout a minimum of 1-1/2 in. below a mortar joint.
   2. Do not form grout keys within beams.
   3. At beams or lintels laid with closed bottom units, terminate the grout pour at the bottom of the beam or lintel without forming a grout key.
   4. Alternate grout placement - Place masonry units and grout using construction procedures emploiyed in the accepted grout demonstration panel.

G. Lap splices minimum 24 bar diameters.

H. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

I. Place and consolidate grout fill without displacing reinforcing.

3.08 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Verify f'm and f'AAC in accordance with Section 1.05

C. Sample and test grout as required in Section 1.04 and 1.05.

3.10 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

E. Remove debris

F. Do not damage the masonry

3.11 PROTECTION

A. Protect adjacent construction and in place masonry against damage.

B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

Section 04 2613
Masonry Veneer

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clay facing brick.

B. Mortar and grout.

C. Reinforcement and anchorage.

D. Flashings.

E. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.

B. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

C. Section 09 9113 - Exterior Painting: Graffiti Resistant Treatment

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

C. ASTM C91/C91M - Standard Specification for Masonry Cement; 2018.

D. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

E. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.

F. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

G. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

H. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.

I. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2005.

J. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

K. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2005.

L. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.04 ADMINISTRATIVE REQUIREMENTS

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.

C. Samples: Submit four samples of decorative block and facing brick units to illustrate color, texture, and extremes of color range.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

E. Maintenance Materials: Furnish the following for City's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar and accessories and structural backup in mock-up.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.09 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

B. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

C. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 UNIT MASONRY - GENERAL

2.02 BRICK UNITS

A. Manufacturers:
   1. H.C. Muddox;https://www.hcmuddox.com/.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
   1. Color and Texture: 95/5 Blend
      a. 95% Old Sacramento Blend
      b. 5% Clinker - Tubmle to match level of tumbling of Old Sacramento Blend
   2. Nominal Size: Standard - 2-1/2 x 8 inch..
      a. 3/4" thin brick veneer
      b. Approx. 1" thin brick veneer - solid, non cored, full brick cut in half at soldier course.
      c. Full brick veneer with anchoage attachment where indicated
   3. Special Shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.03 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M Type S.
   1. Product: Spec Mix Polymer Modified AVM Mortar.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Hydrated Lime: ASTM C207, Type S.
   1. Color: Grey

C. Water: Clean and potable.

2.04 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) yield strength, deformed billet bars; galvanized.

B. Joint Reinforcement Type: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

C. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.

2.05 FLASHINGS

A. Metal Flashing Materials: Galvanized Steel or prefinsihed flashing, as specified in Section 07 6200 or as indicated on the drawings.

2.06 ACCESSORIES

A. Building Paper: ASTM D226/D226M, Type I ("No. 15") asphalt felt.

B. Weeps:
   1. Type: Preformed aluminum vents with sloping louvers.
   2. Color(s): As selected by Architect from manufacturer's full range to complement brick veneer.

C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, Proportion Specification.
   1. Masonry below grade and in contact with earth; Type S.

B. Grout: ASTM C476; consistency as required to fill volumes completely for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Brick Units:
   1. Bond: Running.
   2. Coursing: Three units and three mortar joints to equal 8 inches.
   3. Mortar Joints: Concave.

3.03 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar as work progresses.

E. Interlock intersections and external corners, except for units laid in stack bond.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.

3.04 WEEPS/CAVITY VENTS

A. Install weeps in veneer walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

3.05 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Install horizontal joint reinforcement 12 inches on center.

B. Place continuous joint reinforcement in first and second joint below top of walls.

C. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.

D. Lap joint reinforcement ends minimum 6 inches.

E. Reinforce joint corners and intersections with strap anchors 16 inches on center.

3.06 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up at least 1 inch, minimum, to form watertight pan at non-masonry construction.
2. Remove or cover protrusions or sharp edges that could puncture flashings.
3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Terminate flashing up 8 inches minimum on vertical surface of backing:

C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.07 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

D. Locate control joints at intervals recommended by manufacturer. Verify location with architecte prior to installation.

3.08 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.09 CUTTING AND FITTING

A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.10 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.11 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

This page intentionally left blank

Section 05 1200
Structural Steel Framing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural steel framing members.

B. Structural steel support members and struts.

C. Base plates, shear stud connectors and expansion joint plates.

D. Grouting under base plates.

1.02 RELATED REQUIREMENTS

A. Section 05 2100 - Steel Joist Framing.

B. Section 05 5000 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.03 REFERENCE STANDARDS

A. AISC (MAN) - Steel Construction Manual; 2011.

B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

E. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.

F. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

G. ASTM A242/A242M - Standard Specification for High-Strength Low-Alloy Structural Steel; 2004 (Reapproved 2009).

H. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

I. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

J. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2015.

K. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).

L. ASTM E94/E94M - Standard Guide for Radiographic Examination Using Industrial Radiographic Film; 2017.

M. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2013.

N. ASTM E165/E165M - Standard Test Method for Liquid Penetrant Examination for General Industry; 2012.

O. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2015.

P. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2016.

Q. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2007a.

R. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

S. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2014.

T. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

U. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.

V. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Shop Drawings:
   1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
   2. Connections not detailed.
   3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.

E. Materials Test Reports: Submit independent test results or engineered performance analysis of structural thermal-break pad performance in bearing or slip-critical connections where shear and moment loads are applied.

F. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

G. Fabricator's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."

B. Structural steel members designated as architecturally-exposed structural steel (AESS) to also comply with Section 05 1213.

C. Maintain one copy of each document on site.

D. Fabricator: Company specializing in performing the work of this section with minimum two years of documented experience.

E. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

F. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172. Where IAS certification isn't available, additional Special Inpections shall be required, paid for by the owner.

G. Erector: Company specializing in performing the work of this section with minimum two years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel Angles and Plates: ASTM A36/A36M.

B. Steel W Shapes and Tees: ASTM A992/A992M.

C. Rolled Steel Structural Shapes: ASTM A992/A992M.

D. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.

E. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.

F. Pipe: ASTM A53/A53M, Grade B, Finish black.

G. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.

H. Headed Anchor Rods: ASTM F1554 Grade 36, plain.

I. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

J. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
   2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

2.02 FABRICATION

A. Shop fabricate to greatest extent possible.

2.03 FINISH

A. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

2.04 SOURCE QUALITY CONTROL

A. Welded Connections: Visually inspect all shop-welded connections and test all complete penetration welds and at least ten percent of fillet welds using one of the following:
   1. Radiographic testing performed in accordance with ASTM E94/E94M.
   2. Ultrasonic testing performed in accordance with ASTM E164.
   3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
   4. Magnetic particle inspection performed in accordance with ASTM E709.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

A. Erect structural steel in compliance with AISC 303.

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Welded Connections: Visually inspect all field-welded connections and test all complete penetration welds and at least ten percent of welds using one of the following:
   1. Radiographic testing performed in accordance with ASTM E94/E94M.
   2. Ultrasonic testing performed in accordance with ASTM E164.
   3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
   4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION

This page intentionally left blank

Section 05 4000
Cold-Formed Metal Framing

PART 1 GENERAL

1.01 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.

1.02 RELATED REQUIREMENTS

A. Section 051200: Structural building framing.

1.03 REFERENCE STANDARDS

A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016.

B. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

F. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a.

G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

H. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04 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.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Provide data on standard framing members; describe materials and finish, location in project, product criteria, limitation.

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 .

1.06 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. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): www.ssma.com/#sle.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Framing:
   1. CEMCO: www.cemcosteel.com/#sle.
   2. ClarkDietrich: www.clarkdietrich.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Framing Connectors and Accessories:
   1. Same manufacturer as metal framing.

2.02 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.

2.03 FRAMING MATERIALS

A. Studs and Track: ASTM C955; studs formed to channel, C- or Sigma-shaped with punched web; U-shaped track in matching nominal width and compatible height.
   1. Gauge and Depth: As indicated on drawings.
   2. Products:
      a. CEMCO; ProX Header: www.cemcosteel.com/#sle.

B. Joists and Purlins: Fabricated from ASTM A1008/A1008M Designation SS (structural steel) sheet, shop painted.
   1. Gauge and Depth: As indicated on drawings.
   2. Finish: Manufacturer's standard, rust-inhibitive paint.

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 gauge, 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.
   3. 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.

2.04 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.

B. Anchorage Devices: Powder actuated.

C. Welding: Comply with AWS D1.1/D1.1M.

2.05 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

B. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION OF STUDS

A. Install components in accordance with ASTM C1007 requirements and ASTM C1007 requirements.

3.03 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.

END OF SECTION

Section 05 5000
Metal Fabrications

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and aluminum items.

B. Ventilation Screens

C. Metal Roof Accessories - Fineals, Fasica Brackets, Overhand Support Brackets etc.

1.02 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing: Structural steel

B. Section 09 9113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

B. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2012).

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

G. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

J. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

L. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

C. Designer's Qualification Statement.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.

F. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

G. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), 6063 alloy, T6 temper.

B. Bolts, Nuts, and Washers: Stainless steel.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

A. Ventilation Screens:
   1. Size: As indicated on the drawings
   2. Thickness: As indicated on the drawings
   3. Pattern: Custom cut pattern as designed by architect and fabricator
   4. Finish: To match decorative steel light fixtures as manufactured by Steven Handelman Studios

B. Steel roof overhang knee bracket: Steel pipe, angle, and plate as detailed on drawings
   1. Size: As indicated on the drawings
   2. Thickness: As indicated on the drawings
   3. Pattern: Custom cut pattern as designed by architect and fabricator
   4. Finish: To match decorative steel light fixtures as manufactured by Steven Handelman Studios

C. Roof and fasia finials: Steel pipe, angle, sheet, and plate as detailed on drawings
   1. Size: As indicated on the drawings
   2. Thickness: As indicated on the drawings
   3. Pattern: Custom cut pattern as designed by architect and fabricator
   4. Finish: To match decorative steel light fixtures as manufactured by Steven Handelman Studios, roofing or building siding . Finish to be approved by architect and city engineer priore to fabrication.

2.05 DECORATIVE METAL HANDRAILS, FENCE AND BAR COUNTER

A. Mission Style Railing: Per City Standard Detail 4240

B. Handrails
   1. Material: Steel and bronze
   2. Manufacturer: Julius Blum, www.juliusblum.com
   3. Product Numbers:
      a. 4428 - Steel Handrail Moulding
      b. 340 - Steel with Bronze Center Post
      c. 3/8"x1 1/4" flat bar per detail
      d. 481 - Round Hole Post Base
      e. 4428 S - Straight Lamb's Tounge
   4. Finish: Shop primed and painted matte black with epoxy paint, Pro Insustrial Water Based Catalyzed Epoxy or approved equal.
   5. Fabricator: Jeff Thies, Thiessen Design 805-547-1947 www.thiessendesign.com

C. Fence and Planter Fence
   1. Material: Steel and Bronze

2. Manufacturer: Julius Blum, www.juliusblum.com
3. Product Numbers:
   a. 340 - Steel with Bronze Center Post
   b. 337 - Steel and Bronze Spindle
   c. 481 - Round Hole Post Base
   d. 971 - Ornamental Valance
   e. 4428 - Steel Handrail Moulding including terminal, center and corner pieces with urn bases at posts
   f. 3/8"x1 1/4" flat bar per detail
   g. 3/4" steel bar
   h. 1/2" picket
   i. 1" O.D. x 1/4" steel post
4. Fabricator: Jeff Thies, Thiessen Design 805-547-1947

D. Bar Counter
1. Material: Steel
2. Components: As specified in the detail
3. Finish: Hot Dip Galvanized and painted matte black with epoxy paint.
4. Fabricator: Jeff Thies, Thiessen Design 805-547-1947

PART 3 EXECUTION

4.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

4.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

4.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Perform field welding in accordance with AWS D1.1/D1.1M.

D. Obtain approval prior to site cutting or making adjustments not scheduled.

E. After erection, prime welds, abrasionsand surfaces not shop primed or galvanized , except surfaces to be in contact with concrete.

F. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply or brush or spray to provide minimum dry film thickness of 0.051 mm (2.0 mils).

G. At all galvanized products, clean all damaged areas and re-coat using specified galvanizing coating per manufacturer's criteria.

4.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

This page intentionally left blank

Section 07 1113
Bituminous Dampproofing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Bituminous dampproofing.

B. Protection boards.

1.02 RELATED REQUIREMENTS

A. Section 04 2613 - Masonry Veneer

1.03 REFERENCE STANDARDS

A. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011.

B. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2011).

C. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2019.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Provide properties of primer, bitumen, and mastics.

C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

D. Installer's qualification statement.

1.05 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bituminous Dampproofing Manufacturers:

1. W. R. Meadows, Inc: www.wrmeadows.com/#sle.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 BITUMINOUS DAMPPROOFING

A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
   1. Asphalt-Base Emulsion for Metal Protective Coating: ASTM D1187/D1187M, Type I - Continuous water exposure within few days after drying.
   2. Emulsified Asphalt for Roofing Protective Coating: ASTM D1227/D1227M, Type II, Class 1 - Mineral colloid emulsifying agents with non-asbestos fibers.
   3. VOC Content: Not more than permitted by local, State, and federal regulations.
   4. Applied Thickness: 1/8 inch, minimum, wet film.
   5. Products:
      a. W. R. Meadows, Inc; Sealmastic Emulsion Type II (brush/spray-grade): www.wrmeadows.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

2.03 BITUMEN MATERIALS

A. Cold Asphaltic Type:
   1. Emulsified Asphalt: ASTM D1227/D1227M, with fiber reinforcement other than asbestos, Type II, Class 1 .
   2. Asphalt Primer: ASTM D41/D41M, compatible with substrate.

2.04 ACCESSORIES

A. Protection Board: 1/8-inch thick biodegradable hardboard or as required by the manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

3.03 APPLICATION

A. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.

B. Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.

C. Apply bitumen in accordance with manufacturer's written recommendations .

D. Apply from finish grade elevation down to top of footings. Do not extend onto surfaces exposed to view when project is complete

E. Seal items watertight with mastic, that project through dampproofing surface.

F. Place protection board directly over dampproofing, butt joints, and adhere to tacky dampproofing.

G. Scribe and cut boards around projections, penetrations, and interruptions.

3.04 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

3.05 PROTECTION

A. Protect membrane with immediate application of protection course if no drainage system is used or rolled matrix drainage system.

B. Backfill within 24 - 48 hours using care to avoid damaging the dampproofing.

END OF SECTION

This page intentionally left blank

Section 07 1300
Sheet Waterproofing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Self-adhered modified bituminous sheet membrane.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete substrate.

1.03 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2013).

B. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2012.

C. ASTM D5385/D5385M - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes; 1993 (Reapproved 2014).

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2021.

E. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Provide data for membrane.

C. Manufacturer's Installation Instructions: Indicate special procedures.

D. Warranty: Submit manufacturer warranty and ensure forms have been completed in City's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until liquid or mastic accessories have cured.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Contractor to correct defective Work within period of five years after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to City.

C. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.01 SHEET WATERPROOFING APPLICATIONS

A. Self-Adhered Modified Bituminous Sheet Membrane:
   1. Location: Back of site retaining walls and at adobe foundation.

2.02 SHEET WATERPROOFING MATERIALS

A. Self-Adhered Modified Bituminous Sheet Membrane:
   1. Thickness: 60 mil, 0.060 inch, minimum.
   2. Sheet Width: 36 inches, minimum.
   3. Tensile Strength:
      a. Film: 5900 psi , minimum, measured in accordance with ASTM D882 and at grip-separation rate of 2 inches per minute.
      b. Membrane: 460 psi, minimum, measured in accordance with ASTM D412 Method A, using die C and at spindle-separation rate of 2 inches per minute.
   4. Elongation at Break: 300 percent, minimum, measured in accordance with ASTM D412.
   5. Water Vapor Permeance: .036 perm, maximum, measured in accordance with ASTM E96/E96M.
   6. Hydrostatic Pressure Resistance: Membrane resists leakage for at least one hour from pressure equivalent to 200 feet head of water applied in accordance with test method ASTM D5385/D5385M.
   7. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.
   8. Products:
      a. W.R. Meadows, Inc; MEL-ROL: www.wrmeadows.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

A. Waterproofing accessories for retaining walls shall be a complete system from the manufacturer of the membrane.

B. Seaming Materials: As recommended by membrane manufacturer.

C. Membrane Sealant: As recommended by membrane manufacturer.

D. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.

E. Protection Board: Provide type capable of preventing damage to waterproofing due to backfilling and construction traffic.
   1. Polystyrene foam board, 1/4" inch thick.
   2. Products:
      a. Dow Protection Board III.
      b. Substitutions: See Section 01 6000 - Product Requirements.

F. Drainage Panel: Drainage layer with geotextile filter fabric on earth side.
   1. Composition: Dimpled polystyrene, polyethylene, or polypropylene core; polypropylene filter fabric.
   2. Thickness: 1/4 inch.
      a. Products:
         1) W.R. Meadows, Inc; Mel-Drain 5012: www.wrmeadows.com/#sle.
         2) Substitutions: See Section 01 6000 - Product Requirements.

G. Flexible Flashings: Type recommended by membrane manufacturer.

H. Adhesives: As recommended by membrane manufacturer.

I. Additional sealnts and accessories as required by the manufacturer for a complete and watertight installation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting work.

B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.

C. Verify that items penetrating surfaces to receive waterproofing are securely installed.

D. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect adjacent surfaces from damage not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.

D. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

3.03 INSTALLATION - MEMBRANE

A. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.

B. Roll out membrane, and minimize wrinkles and bubbles.

C. Self-Adhering Membrane: Remove release paper layer, and roll out onto substrate with a mechanical roller to provide full contact bond.

D. Overlap edges and ends, minimum 3 inches, seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.

E. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.

F. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.

G. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.

H. Seal membrane and flashings to adjoining surfaces.

3.04 INSTALLATION - DRAINAGE PANEL and PROTECTION BOARD

A. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward; scribe and cut boards around projections, penetrations, and interruptions.

B. Place protection board directly against drainage panel; butt joints, and scribe and cut boards around projections, penetrations, and interruptions.

C. Adhere protection board to substrate with compatible adhesive.

3.05 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION

Section 07 2500
Weather Barriers

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water-resistive barriers.

1.02 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

B. Section 09 2236 - Lath: Second layer weather barrier installed as part of lath

1.03 DEFINITIONS

A. Weather Barriers: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.

B. Water-Resistive Barrier: A material behind an exterior wall covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly.

1.04 REFERENCE STANDARDS

A. ASTM D779 - Standard Test Method for Water Resistance of Paper, Paperboard, and Other Sheet Materials by the Dry Indicator Method; 2003.

B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2021.

E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

F. ASTM E2273 - Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies; 2003 (reapproved 2011).

G. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc.; 2013.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Provide data on material characteristics.

C. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.06 MOCK-UPS

A. Construct weather barrier mock-up, 10 feet long by 10 feet wide, indicating instalation at penetrations, top of wall, and base of wall..

B. Locate where directed.

C. Mock-up may remain as part of work.

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.01 WATER-RESISTIVE BARRIER MATERIALS

A. Drainable Barrier Sheet: Multi-layer nonwoven and nonperforated polpropylene with rain screen matrix bonded on back side.
   1. Width: 4.4 feet, minimum.
   2. Water Vapor Permeance: 19 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.
   3. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 180 days of weather exposure.
   4. Drainage gap: 3 mm minumum passing ASTM E2273
   5. Products:
      a. VaproShield: WrapShield RS: vaproshield.com - Basis of Design
      b. Tamlyn; TamlynWrap Rain Screen 6.3: www.tamlyn.com
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

A. Sealants, Tapes, and Accessories Used for Sealing Water-Resistive Barrier and Adjacent Substrates: As indicated or complying with water-resistive barrier manufacturer's installation instructions.

B. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
   1. Width: 4 inches.

C. Thinners and Cleaners: As recommended by water-resistive barrier manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions comply with requirements of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Water-Resistive Barriers: Install continuous water-resistive barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

C. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
   1. Seal joint between slab or curb and wall above.

D. Mechanically Fastened Exterior Sheets:
   1. Install sheets shingle-fashion to shed water, with seams aligned horizontal.
   2. Overlap seams as recommended by manufacturer, 6 inches, minimum.
   3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches, minimum.
   4. Attach to framed construction with fasteners extending through sheathing into framing, and space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
   5. For applications indicated to be airtight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners as recommended by manufacturer.
   6. Install water-resistive barrier over jamb flashings.
   7. Install head flashings under water-resistive barrier.
   8. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.

E. Openings and Penetrations in Exterior Water-Resistive Barriers:
   1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches onto water-resistive barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
   2. At openings filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at

least 4 inches wide; do not seal sill flange.

3. At openings filled with nonflanged frames, seal water-resistive barrier to each side of framing at opening using flashing at least 9 inches wide, and covering entire depth of framing.
4. At head of openings, install flashing under water-resistive barrier extending at least 2 inches beyond face of jambs; seal water-resistive barrier to flashing.
5. At interior face of openings, seal gaps between window and door frames and rough framing using appropriate joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating items and seal to surface of water-resistive barrier.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. City's Inspection and Testing: Cooperate with City's testing agency.
   1. Allow access to work areas and staging.
   2. Notify City's testing agency in writing of schedule for work of this section to allow sufficient time for testing and inspection.
   3. Do not cover work of this section until testing and inspection is accepted.

C. Do not cover installed water-resistive barriers until required inspections have been completed.

D. Take digital photographs of each portion of installation prior to covering up weather barriers.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

Section 07 4113
Metal Roof Panels

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal roof panel system of preformed steel panels.

1.02 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing: Roof framing and purlins.

B. Section 05 4000 - Cold-Formed Metal Framing: Roof Framing

C. Section 06 1000 - Rough Carpentry: Roof sheathing.

D. Section 07 9200 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

B. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).

C. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.

D. ASTM D5147/D5147M - Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material; 2018.

E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2021.

F. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2012).

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Summary of test results, indicating compliance with specified requirements.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

4. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.

D. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.

E. Test Reports: Indicate compliance of metal roofing system to specified requirements.

F. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in City's name and are registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 10 years of documented experience.

B. Panel manufacturers without full supporting literature, Flashings & Details Guides, Guide Specifications and Technical Support shall not be considered equal to the specified product.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least 5 years of documented experience or certified by the manufacturer.

1.06 REGULATORY AGENCY REQUIREMENTS

A. Comply with CBC and local Building Code requirements if more restrictive than those specified herein.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of ten years from Date of Substantial Completion.

C. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of 10 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Architectural Metal Roof Panel Manufacturers:
   1. Metal Sales Manufacturing Corporation: Vertical Seam https://www.metalsales.us.com/.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
   1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.
   2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
   3. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.

2.03 METAL ROOF PANELS

A. Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

B. Metal Panels: Factory-formed panels with factory-applied finish.
   1. Steel Panels:
      a. Aluminum-zinc alloy-coated steel complying with ASTM A792/A792M; minimum AZ50 coating.
      b. Steel Thickness: Minimum 24 gauge, 0.024 inch.
   2. Profile: Standing seam, with minimum 1.75 inch seam height; concealed fastener system for field seaming with special tool.
   3. Texture: Striated.
   4. Length: Maximum possible length to minimize lapped joints. Where lapped joints are unavoidable, space laps so that each sheet spans over three or more supports.
   5. Width: Maximum panel coverage of 12 inches.
   6. Color: Weathered Copper W50.

2.04 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 FINISHES

A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss as selected by Architect from manufacturer’s standard line as noted abo

2.06 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

C. Sealants:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

2.07 SHEET MATERIALS

A. Location
   1. Field: One layer of ashpaltic underlayment.
   2. Crickets, valleys, headwall flashing, sidewall flasing and roof penetraions: Self-adhering rubber modified asphalt

B. Underlayment: Self-adhering polymer modified asphalt sheet complying with ASTM D1970/D1970M, with strippable release film and top surface of woven polypropylene sheet.
   1. Sheet Thickness: 80 mil, 0.080 inch minimum total thickness.
   2. Self Sealability: Nail sealability in accordance with ASTM D5147/D5147M
   3. Water Vapor Permeance: 0.1 perm, maximum, when tested in accordance with ASTM E96/E96M using Desiccant Method (Method A).
   4. UL Class A Rated when tested in accordance with UL 790
   5. Products:
      a. Polyglass USA, Inc; Polystick XFR, Fire Resistant Self-Adhered Roof Underlayment: www.polyglass.us/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Broom clean sheathing prior to installation of roofing system.

B. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to ensure that completed roof will be free of leaks.

C. Coordinate installation of waterproof membrane over roof sheathing with Section 06 1000.

D. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.

E. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.

F. At locations where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place allowing for thermal and structural movement.
   1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
   2. Minimize field cutting of panels. Where field cutting is required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.

B. Accessories: Install necessary components that are required for complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

C. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.

3.04 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

This page intentionally left blank

Section 07 4213
Metal Wall Panels

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured metal panels for exterior wall panels, soffit panels, and subgirt framing assembly, with related flashings and accessory components.

1.02 RELATED REQUIREMENTS

A. Section 07 2500 - Weather Barriers: Water-resistive barrier under wall panels.

B. Section 07 9200 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

1.04 SUBMITTALS

A. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
   1. Physical characteristics of components shown on shop drawings.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions and recommendations.

B. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and methods of anchorage.

C. Samples: Submit two samples of wall panel and soffit panel, 12 inches by 12 inches in size illustrating finish color, sheen, embossing, and texture.

D. Manufacturer's qualification statement.

E. Installer's qualification statement.

F. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in City's name and registered with installer.

1.05 MOCK-UPS

A. Construct mock-up, 4 feet long by 4 feet wide; include panel and soffit system, glazing, attachments to building frame, associated vapor retarder and air seal materials, weep drainage system, sealants and seals, and related insulation in mock-up.

B. Locate as directed by Architect.

C. Mock-up may remain as part of work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.

C. Prevent contact with materials that may cause discoloration or staining of products.

1.07 FIELD CONDITIONS

A. Do not install wall panels when air temperature or relative humidity are outside manufacturer's limits.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Finish Warranty: Provide 5-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in City's name and register with warrantor.

C. Special Warranty: Provide 2-year warranty covering water tightness and integrity of seals of metal wall panels. Complete forms in City's name and register with warrantor.

D. Installation Warranty for Building Rainscreen Assembly: Installer of exterior rainscreen assembly (including air/vapor barrier and attachments, framing, and exterior panels) to provide 10-year warranty that includes coverage for defective materials and/or workmanship. This warranty will also clearly include materials, labor, necessary activity to access these areas, and removal of any materials to effect repairs and restore to watertight conditions. www.edacontractors.com/#sle

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Wall Panels - Concealed Fasteners:
   1. D. Architectural Metal Solutions Incorporated; Aluminum Plate Rainscreen System – Series CPRS: https://damsinc.com/.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Metal Soffit Panels:
   1. Longboard Architectural Products; Tongue and Groove Soffit V-Groove.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 METAL WALL PANEL SYSTEM

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
   1. Provide exterior wall panels and subgirt framing assembly.
   2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
   3. Maximum Allowable Deflection of Panel: L/180 for length(L) of span.
   4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
   5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
   6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
   7. Corners: Factory-fabricated in one continuous piece with minimum 4-inch returns.

B. Exterior Wall Panels:
   1. Profile: Vertical and horizontal, as indicated; style as indicated.
   2. Side Seams: Double-interlocked with reveal, rainscreen system.
   3. Material: Precoated aluminum sheet, 8 gauge, .125 inch minimum thickness.
   4. Panel Width: As indicated on the drawings.
   5. Panel Depth: 2 inch , Manufacturer Standard
      a. At Doors: Contractor to coordinate depth of "Cookie Sheet" cladding or glazed in planes with adjacent trades and manufacturers.
   6. Panel Joints: Manufacturer's standard; 1/2" Maximum.
   7. Surface Applied Medallion: Full CNC 3/8" plate aluminum.
      a. Material: Same as metal wall panel.
      b. Shape and Size: As indicated on the drawings
      c. Finish: Same as metal wall panel.

C. Soffit Panels:
   1. Profile: 4 inch V-Groove, with venting not provided.
   2. Profile: [2.5 inch V-Groove], with venting provided.
      a. Provide one row of ventilated soffit panel and restroom and kiosk canopy.
   3. Profile: [6 inch V-Groove], with venting not provided.
      a. Vertical appliation
   4. Material: Precoated aluminum sheet, 16 gauge, .0625 inch minimum thickness.
   5. Color: As selected by Architect from manufacturer's standard line.
      a. Color: Dark Fir, DFR
   6. Accesories: as required by manufacturer for complete installation
      a. Quick Screen Clip
      b. Pan Head Screws
      c. Trims as required; Starter track, termination set, and flat reveal at mitered corners.

D. Subgirt Framing Assembly:

1. Manufacturer's standard profile; to attach panel systems to building.

E. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

F. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

G. Anchors: Galvanized steel or as recommended by manufacturer for substrate.

2.03 MATERIALS

A. Wall Panels: Non-Precoated Aluminum Sheet: ASTM B209/B209M, 3003 alloy, with temper as required, with smooth surface, mill finish, or as otherwise recommended by metal producer for required finish.
   1. Thickness: 0.125 inch, minimum.

B. Soffit Panels: Non-Precoated Aluminum Sheet: ASTM B209/B209M, 6063 alloy, T5 temper as required, with smooth surface, mill finish, or as otherwise recommended by metal producer for required finish.

2.04 FINISHES

A. Wall Panels: Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss as selected by Architect from manufacturer’s full line: Basis.
   1. Products:
      a. PPG; Duranar: www.ppgmetalcoatings.com/#sle.
         1) Basis of Design: Earthtone UC124848

B. Soffit Panels Fluoroethylene Vinyl Ether (FEVE) Coating: Superior performing resin based organic powder coatings system complying with AAMA 2605; single coat applications when applied to aluminum with dry film thickness (DFT) of 2 to 3 mil, 0.002 to 0.003 inch; color and gloss as scheduled.
   1. Apply coating to exposed metal surfaces with proper preparation and pretreatment in accordance with resin manufacturer's instructions.

2.05 ACCESSORIES

A. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
   1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.

B. Field Touch-up Paint: As recommended by panel manufacturer.

C. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building framing members are ready to receive panels.

B. Verify that water-resistive barrier, see Section 07 2500, has been properly installed over substrate; see Section 05 4000.

3.02 FABRICATION

A. Fabricate and finish aluminum plate wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
   1. Fabricate aluminum plate wall panels in a manner that shall eliminate condensation on interior side of panel and with joints between panels designed to form rain screen type seals.
   2. Back routed panel lines, edges to be sharp and true, with surfaces free from warp and buckle.
   3. Fabricate panels with sharply cut edges, with no displacement of face sheets.
   4. Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural adhesive sealant or bond tape.
   5. Max radius of Edge = 1/8"
   6. Completely fabricate panels, surface applied medallions, and all components with exposed surfaces prior to finishing.

3.03 PREPARATION

A. Install subgirts perpendicular and parallel to panel length, securely fastened to substrates and shimmed and leveled to uniform plane, and spaced at intervals indicated by manufacturer.

B. Protect surrounding areas and adjacent surfaces from damage during execution of this work.

3.04 INSTALLATION

A. Install panels on walls in accordance with manufacturer's instructions.

B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint; allow to dry prior to wall panel installation.

C. Fasten panels to structural supports; aligned, level, and plumb.

D. Provide expansion and control joints where indicated.

E. Use concealed fasteners unless otherwise indicated by Architect.

3.05 TOLERANCES

A. Offset From True Alignment Between Adjacent Members Abutting or In Line: 1/16 inch, maximum.

B. Variation from Plane or Location As Indicated on Drawings: 1/4 inch, maximum.

3.06 CLEANING

A. Remove site cuttings from finish surfaces.

B. Remove protective material from wall panel surfaces.

C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

3.07 PROTECTION

A. Protect metal wall panels until completion of project.

B. Touch-up, repair, or replace damaged wall panels or accessories before Date of Substantial Completion.

END OF SECTION

Section 07 6200
Sheet Metal Flashing and Trim

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, sheet metal roofing, exterior penetrations, and other items indicated in Schedule.

1.02 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry: Metal flashings embedded in masonry.

B. Section 04 2613 - Masonry Veneer

C. Section 05 4000 - Cold-Formed Metal Framing

D. Section 07 7123 - Manufactured Gutters and Downspouts.

E. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

F. Section 08 6200 - Unit Skylights: Integral metal curbs.

G. Section 09 9000 - Painting and Coating: Field painting.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

C. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

D. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

E. CDA A4050 - Copper in Architecture - Handbook; current edition.

F. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Maintain one copy of each document on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 3 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal.

B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal, shop pre-coated with manufacturer's coating.
   1. Aluminum-zinc alloy-coated steel complying with ASTM A792/A792M; minimum AZ50 coating.
   2. Color: As selected by Architect from manufacturer's custom colors.
      a. Flashing directly contacting roofing to be flashed with metal by roofing manufacture to match roofing material.
      b. Basis of Design: Weathered Copper W50 by Metal Sales
      c. Basis of Design Accent Color: Bronze

C. Pre-Finished Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 18 gauge, 0.040 inch thick; plain finish shop pre-coated with PVDF coating.
   1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; pretreated metal with two-coat system including primer and color coat with at least 70 percent PVDF coating.
   2. Color: As selected by Architect from manufacturer's custom colors.
      a. Flashing directly contacting wall panels to be flashed with metal to match wall panel material.
         1) Basis of Design: Duranar; Earthtone UC12484 by PPG; www.ppgmetalcoatings.com

D. Note: Flashing directly contacting roofing to be flashed with metal by roofing manufacture to match roofing material.

2.02 ACCESSORIES

A. Sealant: Type specified in Section 09 7200.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 12-inch long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward as requied by the condition and hemmed to form drip.

G. Fabricate flashings to allow toe to extend 4 inches over roofing -. Return and brake edges.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

C. In the event of a discrepancy, immediately notify the Architect.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.03 INSTALLATION

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

END OF SECTION

Section 07 7123
Manufactured Gutters and Downspouts

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pre-finished galvanized steel gutters and downspouts.

B. Precast concrete splash pads.

1.02 RELATED REQUIREMENTS

A. Section

B. Section 07 4113 - Metal Roof Panels

C. Section 07 6200 - Sheet Metal Flashing and Trim.

D. Section 22 0000 - Plumbing

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

B. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

C. Samples: Submit two samples, 12 inch long, illustrating component design, finish, color, and configuration.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.

B. Prevent contact with materials that could cause discoloration, staining, or damage.

1.07 PROJECT CONDITIONS

A. Coordinate the work with downspout discharge pipe inlet.

PART 2 PRODUCTS

2.01 MATERIALS

A. Factory-formed steel with factory-applied finish.
   1. Aluminum-zinc alloy-coated steel complying with ASTM A792/A792M; minimum AZ50 coating.
   2. Color: As selected by Architect from manufacturer's custom colors.
      a. Basis of Design: Weathered Copper W50 by Metal Sales

2.02 COMPONENTS

A. Gutters: Profile as indicated.

B. Downspouts: CDA rectangular profile SMACNA rectangular profile .

C. Anchors and Supports: Profiled to suit gutters and downspouts.
   1. To match existing
   2. Anchoring Devices: In accordance with SMACNA requirements.
   3. Gutter Supports: Brackets.
   4. Downspout Supports: Brackets.

2.03 ACCESSORIES

A. Splash Pads: Precast concrete type, cast 12 by 24 by 3 inches; minimum 3,000 psi compressive strength at 28 days, with minimum 5 percent air entrainment.

B. Strainer Guard: Install "K-Style" strainer-guard at formed gutters, removable for cleaning.

C. Downspout Nozzle: Cow's tounge style, polished bronze

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Paint concealed sheet metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.03 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.

B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.

C. Slope gutters 1/16 inch per foot .

D. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

E. Set splash pads under downspouts and scuppers.

END OF SECTION

This page intentionally left blank

Section 07 9200
Joint Sealants

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

B. 32 1313 - Concrete Paving: Sealant at expansion joints

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

1.04 SUBMITTALS

A. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.

B. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.05 WARRANTY

A. Installer's Warranty: Correct defective work within a two year period after Date of Substantial Completion.

B. Manufacturer'sWarranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure for a period of one

year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
   1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   2. Bostik Inc: www.bostik-us.com.
   3. Dow Corning Corporation: www.dowcorning.com/construction/sle.
   4. Hilti, Inc: www.us.hilti.com/#sle.
   5. Pecora Corporation: www.pecora.com.
   6. Tremco Global Sealants: www.tremcosealants.com.
   7. Sherwin-Williams Company: www.sherwin-williams.com.
   8. Sika Corporation: www.usa-sika.com.
   9. W.R. Meadows, Inc: www.wrmeadows.com/sle.

B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
   1. Bostik Inc: www.bostik-us.com.
   2. Dow Corning Corporation: www.dowcorning.com/construction/sle.
   3. Pecora Corporation: www.pecora.com.
   4. Tremco Global Sealants: www.tremcosealants.com.
   5. Sika Corporation: www.usa-sika.com.
   6. W.R. Meadows, Inc: www.wrmeadows.com/sle.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between different exposed materials.
      c. Expansion joints in paving.
      d. Other joints indicated below.
   2. Do not seal the following types of joints.
      a. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      b. Joints where installation of sealant is specified in another section.

B. Exterior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
   1. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 6116.

B. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

C. Colors: As as selected by architect from manufacturer's full range

2.04 NONSAG JOINT SEALANTS

A. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus ____ percent, minimum.
   2. Manufacturers:
      a. Sherwin-Williams Company; Stampede 2NS Polyurethane Sealant: www.sherwin-williams.com/#sle.
      b. Sika Corporation; Sikaflex-2c NS: www.usa-sika.com/#sle.
      c. W. R. Meadows, Inc; POURTHANE NS: www.wrmeadows.com/#sle.

2.05 SELF-LEVELING SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: Gray.
   4. Manufacturers:
      a. Pecora Corporation; Urexpan NR-200 and/or Dynatred: www.pecora.com.
      b. Sherwin-Williams Company; Loxon SL1 Polyurethane Self-Leveling Sealant: www.sherwin-williams.com.
      c. Sherwin-Williams Company; Loxon SL2 Polyurethane Self-Leveling Sealant: www.sherwin-williams.com.
      d. Sika Corporation; Sikaflex-1c SL: www.usa-sika.com/#sle.
      e. Sika Corporation; Sikaflex-2c SL: www.usa-sika.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION

Section 08 1113
Hollow Metal Doors and Frames

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Thermally insulated hollow metal doors with frames.

C. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware.

B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.

C. Section 09 9113 - Exterior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. ASTM - American Society for Teesting Materials.

C. NFPA: National Fire Protection Association.

D. SDI: Steel Door Institute.

E. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

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

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.

I. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

J. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.

K. ASTM E413 - Classification for Rating Sound Insulation; 2010.

L. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

M. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

N. ITS (DIR) - Directory of Listed Products; current edition.

O. NAAMM HMMA 810 - Hollow Metal Doors

P. NAAMM HMMA 820 - Hollow Metal Frames

Q. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

R. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

S. NAAMM HMMA 850 - Fire-Protection and Smoke Control Rated Hollow Metal Door and Frame Products; 2014.

T. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.

U. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

V. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.

W. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

X. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

Y. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening and each different wall opening condition, showing elevations, glazing, anchorage, frame profiles, and any indicated finish requirements.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

F. Manufacturer's Qualification Statement.

G. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Maintain at project site copies of reference standards relating to installation of products specified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door, an Assa Abloy Group company; .: www.assaabloydss.com/#sle.
   2. Steelcraft, an Allegion brand; .: www.allegion.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1, ADA Standards, and CBC Chapter 11B
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Manufacturers standard for application indicated.
   5. Typical Door Face Sheets: Embossed. Refer to Door Schedule for additional information.

B. Hollow Metal Panels: Same construction, performance, and finish as doors.

C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Type 1 ,Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 3 - Extra Heavy-duty.
      b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 3 - Stile and Rail.
      d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
   2. Door Thickness: 1-3/4 inches, nominal.
   3. Door Finish: Factory primed and field finished.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Exterior Door Frames: Fully welded. Steelcraft F and FN series
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Frame Metal Thickness: 12 gage, 0.093 inch, minimum.
   3. Frame Finish: Factory primed and field finished.

C. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

A. Louvers: Roll formed steel with overlapping frame; factory-painted finish, color as selected; factory-installed.

B. Door Window Frames: Door window frames with glazing securely fastened within door opening.
   1. Size: As indicated on drawings.
   2. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.

C. Glazing: As specified in Section 08 8000, factory installed.

D. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Install door hardware as specified in Section 08 7100.

F. Comply with glazing installation requirements of Section 08 8000.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

Section 08 3313
Coiling Counter Doors

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated coiling counter doors and operating hardware.

1.02 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing

1.03 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Submit manufacturer's standard literature showing materials and details of construction and finish. Include data on electrical operation.

C. Shop Drawings: Indicate rough and actual opening dimensions, anchorage methods, hardware locations, and installation details.

D. Samples: Two slats, 4 inches long, illustrating shape, color, and finish texture.

E. Manufacturer's Installation Instructions: Indicate installation sequence and installation, adjustment, and alignment procedures.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Operation and Maintenance Data: Indicate modes of operation, lubrication requirements and frequency, and periodic adjustments required.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty for counterbalance shaft assembly. Complete forms in City's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Coiling Counter Doors:
   1. C.H.I. Overhead Doors; Model 6566 (stainless): www.chiohd.com/#sle.
   2. Overhead Door: Model 651(stainless): https://www.overheaddoor.com/counter-doors-651.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COILING COUNTER DOORS

A. Coiling Counter Metal Doors, Non-Fire-Rated: Stainless steel slat curtain.
   1. Mounting: Interior face mounted.
   2. Nominal Slat Size: 1 1/2 inches wide.
   3. Slat Profile: Flat.
   4. Interior Finish, Stainless Steel: No. 4 - Brushed.
   5. Curtain Color: Exterior side to be as selected by Architect from manufacturer's custom range to match wall panels.
   6. Guides: Formed track; stainless steel same material and finish as interior unless otherwise indicated.
   7. Hood Enclosure: Manufacturer's standard; primed steel.
   8. Manual push up operation.
   9. Locking Devices: Slide bolt on inside.

2.03 COMPONENTS

A. Metal Curtain Construction: Interlocking, single-thickness slats.
   1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
   2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
   3. Stainless Steel Slats: ASTM A666, Type 304; minimum thickness 22 gauge, 0.03 inch.

B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.
   1. Stainless Steel Guides: ASTM A666, Type 304, rollable temper.

C. Hood Enclosure: Internally reinforced to maintain rigidity and shape.

D. Lock Hardware:
   1. Latch Handle: Manufacturer's standard.

2. Slide Bolt: Provide on both-jamb sides, extending into slot in guides, with padlock on both sides..

E. Roller Shaft Counterbalance: Steel pipe and torsion steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that adjacent construction is suitable for door installation.

B. Verify that electrical services have been installed and are accessible.

C. Verify that door opening is plumb, header is level, and dimensions are correct.

D. Notify Architect of any unacceptable conditions or varying dimensions.

E. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Install perimeter trim as indicated.

3.03 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

END OF SECTION

Section 08 4313
Aluminum-Framed Storefronts

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. All required attachments, trim, and accessories to provide a complete installation.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry

B. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

B. AAMA 501.4 - Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts; 2009.

C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

E. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

F. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

J. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

K. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 PERFORMANCE REQUIREMENTS

A. Design and size components to withstand the following load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   1. Design Wind Loads: Comply with requirements of California Building code.
      a. 70 mph wind speed, exposure C
   2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

B. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.

C. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.

D. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 6.00 lbf/sq ft.

E. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

F. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

1.06 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 6 inches long illustrating finished aluminum surface .

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in City's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

B. Single Source Responsibility: Obtain storefronts through one source from a single manufacturer.

C. Installer - The storefront installer shall be currently approved by the manufacturer, and have experience of at least five (5) years installing the selected system.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

C. Replacements - In the event of damage, including water intrusion, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the University.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
      d. Water leakage through fixed glazing and framing areas.
      e. Failure of operating components to function properly.
   2. Warranty Period: 2 years.

C. Provide two year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. All storefront and entrances system components shall be the product of a single manufacturer and represent an integrated system.

B. The aluminum storefront system was designed based on the product of Arcadia as a standard of quality.

C. Aluminum-Framed Storefront and Doors:
   1. Kawneer North America; Trifab 451T: www.kawneer.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ALUMINUM-FRAMED STOREFRONT

A. Glazing: Refer to Section 08 8000 Glazing.

B. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Rabbet: For 1 inch insulating glazing.
   2. Glazing Position: Center Set.
   3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
   4. Condensation Resistance Factor: 40 minimum
   5. Finish: Class I color anodized.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
   6. Finish Color: Custom color from manufacturer's full range.
   7. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   8. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   10. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
   11. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
   12. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

C. Performance Requirements
   1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
      a. Design Wind Loads: Comply with requirements of ASCE 7.
      b. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.
   2. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
   3. System shall not deflect more than 1/8” at the center point, or 1/16” at the center point of a horizontal member, once deadload points have been established.
   4. System shall accommodate expansion and contraction movement due to surface temperature differential of 180 degrees F.

5. Seismic testing shall conform to AAMA 504.1 recommended static test method for evaluating performance of curtain walls and storefront wall systems due to horizontal displacements associated with seismic movements and building sway.
6. Thermal Performance – When tested in accordance with AAMA 1503.1 the following results should be attained: U-Maximum .63/CRF – minimum of 59.
7. National Fenestration Rating Council (NFRC) specific application evaluation

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Fabrication Method – Shearblock or equal. Use of exposed fasteners and stacking system with receptor sill not acceptable.
   3. Glazing Stops: Flush.

B. Glazing: See Section 08 8000.

C. Applied Muntins: Prefabricated simulated divided lite grid assembly with perimeter surround; designed to be adhered and fastened to storefront framing members and glazing.
   1. Material: Extruded aluminum.
   2. Profile: Manufacturer's standard.
   3. Finish: Same as storefront.

D. Infill Panels: 1 inch thick aluminum sheet. Provide "Cookie Sheet" infill by same manuacturer as metal wall panels.

E. Doors: Glazed aluminum. Series 500 Heavy Wall Wide stile
   1. Thickness: 2 inches.
   2. Top Rail: 5 inches wide.
   3. Vertical Stiles: 5 inches wide.
   4. Cross Rail: 6 inches wide.
   5. Bottom Rail: 10 inches wide.
   6. Glazing Stops: Square.
   7. Bottom Rail Weathering: standard dual felt
   8. Finish: Same as storefront.
   9. Hinges: Continuous hinge
   10. Threshold: 5 inch, clear anodized

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Fasteners: Stainless steel.

C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 FINISHES

A. Comply with AA DAF-45 for aluminum finishes required.

B. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.

C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.06 FABRICATION

A. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

B. A. Continuous sub-sill shall be provided under sill members to collect water infiltration and divert from the interior of the system.

C. Develop drainage holes with moisture pattern to exterior.

D. B. Framing members shall be internally reinforced and secured at head and sill as necessary for structural performance requirements, for hardware attachment, and as indicated.

E. C. Fasteners shall be so located as to ensure concealment from view in the final assembly.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Coordinate attachment and seal of perimeter air and vapor barrier materials.

I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

J. Install glass and infill panels in accordance with Section 08 8000, using glazing method required to achieve performance criteria.

K. Install applied muntin grid assembly in accordance with manufacturer's instructions.

L. Install perimeter sealant in accordance with Section 07 9005.

M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Remove excess sealant by method acceptable to sealant manufacturer.

3.05 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

This page intentionally left blank

Section 08 6200
Unit Skylights

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Skylights with integral frame.

B. Operating mechanism.

1.02 RELATED REQUIREMENTS

A. Section 05 4000 - Cold-Formed Metal Framing

B. Section 07 4113 - Metal Roof Panels: Building Roofing

1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

D. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Include structural, thermal, and daylighting performance values.

C. Performance Validation: Provide specified performance validation before submitting shop drawings or starting fabrication.

D. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
   1. Evidence of AAMA Certification.
   2. Evidence of WDMA Certification.
   3. Evidence of CSA Certification.
   4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.

E. Installer's qualification statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide five-year manufacturer warranty including coverage for leakage due to defective skylight materials or construction. Complete forms in City's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Unit Skylights:
   1. FAKRO America LLC: www.fakrousa.com/#sle.
   2. Velux America, Inc: www.veluxusa.com/#sle.
   3. Wasco Skylights - Part of the VELUX Group: www.wascoskylights.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SKYLIGHTS

A. Skylights: Factory-assembled glazing in aluminum frame, free of visual distortion, and weathertight.
   1. Shape: Rectangular dome.
   2. Glazing: Single.
   3. Operation: None; fixed.
   4. Nominal Size: 24 by 48 inch.
   5. Color: As selected from manufacture's full line to complement roofing.

2.03 PERFORMANCE REQUIREMENTS

A. Provide unit skylights that comply with the following:
   1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific skylight type:
   2. Performance Validation: Skylights shall comply with AAMA/WDMA/CSA 101/I.S.2/A440 performance requirements as indicated by having AAMA, WDMA, or CSA certified label, or an independent test report for indicated products itemizing compliance and acceptable by authorities having jurisdiction.
   3. Allow for expansion and contraction within system components caused by a cycling surface temperature range of 170 degrees F without causing detrimental effects to system or components.

2.04 COMPONENTS

A. Single Glazing: Polycarbonate plastic; clear transparent.

B. Frames: ASTM B221 ASTM B221M Extruded aluminum reinforced and welded corner joints, integral curb frame mounting flange and counterflashing to receive roofing flashing system, with integral condensation collection gutter, glazing retainer; clear anodized finish.

2.05 ACCESSORIES

A. Anchorage Devices: Type recommended by manufacturer, exposed to view.

B. Counterflashings: Same metal type and finish as roofing..

C. Protective Back Coating: Zinc molybdate alkyd.

D. Sealant: Elastomeric, silicone or polyurethane, compatible with material being sealed .

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that openings and substrate conditions are ready to receive work of this section.

3.02 PREPARATION

A. Apply protective back coating on aluminum surfaces of skylight units that will be in contact with cementitious materials or dissimilar metals.

3.03 INSTALLATION

A. Install unit skylights in accordance with manufacturer's instructions and ASTM E2112.

B. Install skylight units and mount securely; install counterflashing as required.

C. Apply sealant to achieve watertight assembly.

END OF SECTION

This page intentionally left blank

Section 08 7100
Door Hardware

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for hollow metal and sliding doors.

B. Thresholds.

C. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Doors and Frames.

1.03 REFERENCE STANDARDS

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

B. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.

C. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2011.

D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.

E. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks; 2014.

F. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.

G. BHMA A156.21 - American National Standard for Thresholds; 2014.

H. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012.

I. BHMA A156.26 - American National Standard for Continuous Hinges; 2012.

J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

B. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; attendance is required by affected installers and the following:
   1. Architect.

2. Installer's Architectural Hardware Consultant (AHC).
3. Hardware Installer.

C. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
2. Provide complete description for each door listed.
3. Provide manufacturer name, product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.

D. Installer's qualification statement.

E. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in City's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

B. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
1. Closers: Five years, minimum.
2. Locksets and Cylinders: Three years, minimum.
3. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Provide door hardware products that comply with the following requirements:
   1. Applicable provisions of federal, state, and local codes.
   2. Accessibility: ADA Standards and ICC A117.1.

D. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. See Door Hardware Schedule.

2.02 HINGES

A. Manufacturers:
   1. Hager Companies: www.hagerco.com/#sle.

B. Hinges: Comply with BHMA A156.1, Grade 1.
   1. Continuous Hinges: Comply with BHMA A156.26.
   2. Provide hinges on every swinging door.
   3. Provide following quantity of butt hinges for each door:

2.03 TRACK AND HANGERS

A. Manufacturers:
   1. Basis of Design: Rail Craft Wall Mount 400.

B. Face-Mounted Barn Door Hardware:
   1. Provide steel, square track rail, track fasteners, guides, latches and pulls; size rail and hangers in accordance with manufacturer's recommendations for weight of doors.
   2. Track Length: 96 inch, nominal.
   3. Track Finish: As selected by Architect.
   4. Hardware Style: As selected by Architect.

C. Door Weight: Medium; medium frequency of use with up to 400 lbs door weight.

2.04 LOCK CYLINDERS

A. Manufacturers:

B. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
   1. Provide standard, conventional, and full size interchangeable core (FSIC) type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
   2. Provide cylinders from same manufacturer as locking device.
   3. Provide cams and/or tailpieces as required for locking devices.

2.05 CYLINDRICAL LOCKS

A. Manufacturers:
   1. Schlage, an Allegion brand: www.allegion.com/us/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
   1. Bored Hole: 2-1/8 inch diameter.
   2. Latchbolt Throw: 1/2 inch, minimum.
   3. Backset: 2-3/4 inch unless otherwise indicated.
   4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
      a. Finish: To match lock or latch.

2.06 CLOSERS

A. Manufacturers; Surface Mounted:
   1. LCN, an Allegion brand: www.allegion.com/us/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Closers: Comply with BHMA A156.4, Grade 1.
   1. Type: As indicated in door hardware sets.
   2. Provide door closer on interior side of each exterior swinging door.

2.07 MOP PLATES

A. Manufacturers:
   1. Ives, an Allegion brand: www.allegion.com/us/#sle.

B. Mop Plates: Provide along bottom edge of interior of doors to provide protection from cleaning liquids and equipment damage to door surface.
   1. Size: 6 inch high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.

2.08 THRESHOLDS

A. Manufacturers:
   1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Hager Companies: www.hagerco.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Thresholds: Comply with BHMA A156.21.
   1. Provide threshold at each exterior door, unless otherwise indicated.
   2. Type: Flat surface.
   3. Material: Aluminum.
   4. Threshold Surface: Fluted horizontal grooves across full width.
   5. Field cut threshold to profile of frame and width of door sill for tight fit.
   6. Provide non-corroding fasteners at exterior locations.

2.09 WEATHERSTRIPPING AND GASKETING

A. Manufacturers:
   1. Zero International, Inc: www.zerointernational.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Weatherstripping and Gasketing: Comply with BHMA A156.22.
   1. Head and Jamb Type: Adjustable.
   2. Door Sweep Type: Encased in retainer.
   3. Material: Aluminum, with brush weatherstripping.

2.10 FINISHES

A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
   1. Primary Finish: 613; dark oxidized satin bronze, oil rubbed, with bronze base material (former US equivalent US10B); BHMA A156.18.
   2. Secondary Finish: _____ 622; black oxidized, with bronze base material.; BHMA A156.18.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Do not install surface mounted items until application of finishes to substrate are fully completed.

D. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
   1. Mounting heights in compliance with ADA Standards and CBC 11B.

E. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01 4000 - Quality Requirements.

3.04 ADJUSTING

A. Adjust work under provisions of Section 01 7000 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

D. Adjust closing speed to comply with CBC 11B

3.05 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 PROTECTION

A. Protect finished Work under provisions of Section 01 7000 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

HARDWARE GROUP NO. 01

Doors 101 and 102

Provide each Hanging Slider with the following:

1	EA	BOX RAIL DOOR KIT	6 FT, WALL MOUNT #400		BL	RAIL CRAFT
2	EA	HEAVY DUTY CANE BOLT	BLACK STEEL,		BL	
3	EA	BOLT RECEPTACLE	IN GROUND			
1	EA	FSIC CORE	23-030		622	SCH

HARDWARE GROUP NO. 02

Door 103

Provide with the following:

3	EA	HINGE	B1168 4.5 4.5		613	HAG
1	EA	STOREROOM LOCK	LV9080T 06A		643e	SCH
1	EA	FSIC CORE	23-030		613	SCH
1	EA	SURFACE CLOSER	1461 H REG X SRI		695	LCN
1	EA	THRESHOLD	547D		BRZ	ZER
1	EA	FLOOR STOP	FS436/438 AS REQ.		613	IVES
1	EA	GASKETING	429D		BK	ZER
1	EA	KICK PLATE	8400 10” X 2” LDW		613	IVES
1	EA	SWEEP	39D		BRZ	ZER

HARDWARE GROUP NO. 03

Door 104

Provide SGL door with the following:

1	EA	CONT. HINGE	112XY		313	IVES
1	EA	ENTRY LOCK	LV9453T 06A		643e	SCH
1	EA	FSIC CORE	23-030		613	SCH
1	EA	SURFACE CLOSER	1461 SHCUSH X SRI		695	LCN
1	EA	GASKETING	BY STOREFRONT MANUF.		BK	B/O
1	EA	SWEEP	8192D		DBA	ZER
1	EA	THRESHOLD	547D		BRZ	ZER

END OF SECTION

Section 08 8000
Glazing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

B. Section 08 1416 - Wood Doors: Glazed lites in doors.

C. Section 08 5313 - Vinyl Windows: Glazing provided by window manufacturer.

D. Section

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.

C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

G. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.

H. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2012.

I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.

J. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

K. GANA (GM) - GANA Glazing Manual; 2009.

L. GANA (SM) - GANA Sealant Manual; 2008.

M. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.

N. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.

O. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2014.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data on Insulating Glass Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: Submit two samples 12 by 12 inch in size of glass units.

E. Certificate: Certify that products of this section meet or exceed specified requirements.

F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in City's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM) for glazing installation methods.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.06 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within

specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: 10 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Float Glass Manufacturers:
1. Pilkington North America Inc: www.pilkington.com/na.
2. PPG Industries, Inc; Basis of Design: www.ppgideascapes.com.
3. Oldcastle Building Envelope: www.obe.com

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
2. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
4. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
1. In conjunction with vapor retarder and joint sealer materials described in other sections.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
   2. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
   3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

2.04 INSULATING GLASS UNITS

A. Manufacturers:
   1. Glass: Any of the manufacturers specified for float glass.
   2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.

B. Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
   3. Spacer Color: Bronze.
   4. Edge Seal:
      a. Color: Black.
   5. Purge interpane space with dry air, hermetically sealed.

C. Type IG-1 - Insulating Glass Units: Vision glass, double glazed, safetly glazing
   1. Applications: Exterior glazing unless otherwise indicated.
   2. Space between lites filled with air.
   3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
      a. Tint: Bronze
      b. Coating: Self-cleaning type, on #1 surface.
      c. Coating: Low-E (solar control type), Solarban 67 on #2 surface.
   4. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
      a. Tint: Clear.
   5. Total Thickness: 1 inch.
   6. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.29, maximum.
   7. Visible Light Transmittance (VLT): 05, nominal.
   8. Solar Heat Gain Coefficient (SHGC): 12, maximum.
   9. Glazing Method: Dry glazing method, gasket glazing.

2.05 PLASTIC FILMS

A. Type F-2 - Safety and Security Plastic Film: Micro Layered type.
   1. Application: All glazing shown on the drawings
   2. Tensile Strength: Minimum of 31,500 psi when measured in accordance with ASTM D882.
   3. Color: Clear.
   4. Thickness: 8 mil.
   5. Manufacturers:
      a. 3M Scotchshield Ultra 800 .
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORIES

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

D. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

F. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

G. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

C. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry immediately before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

G. Install safety and security plastic film in accordance with manufacturer's instructions.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

This page intentionally left blank

Section 09 2116
Gypsum Board Assemblies

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Gypsum wallboard.

C. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 05 4000 - Cold-Formed Metal Framing: Structural steel stud framing.

B. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.

1.03 REFERENCE STANDARDS

A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.

B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

D. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

E. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

F. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

G. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

H. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

I. GA-216 - Application and Finishing of Gypsum Board; 2013.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. ClarkDietrich: www.clarkdietrich.com/#sle.
   2. Jaimes Industries: www.jaimesind.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Structural Steel Framing for Application of Gypsum Board: See Section 05 4000.

C. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: C-shaped with knurled or embossed faces.
   2. Runners: U shaped, sized to match studs.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. American Gypsum Company: www.americangypsum.com/#sle.
   2. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
   3. USG Corporation: www.usg.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
      a. Mold resistant board is required at all locations.
   3. Thickness:
      a. Vertical Surfaces: 5/8 inch.
   4. Mold Resistant Paper Faced Products:
      a. American Gypsum Company; M-Bloc Type X: www.americangypsum.com/#sle.
      b. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.
      c. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard: www.gpgypsum.com/#sle.

C. Exterior Sheathing Board: See Section 05 4000.

2.04 GYPSUM BOARD ACCESSORIES

A. Water-Resistive Barrier: See Section 07 2500.

B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.

C. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws,

corrosion-resistant.

D. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Studs: Space studs at 16 inches on center. or as indicated on the structural drawings
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

3.03 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

3.04 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 0: Surfaces indicated to be finished in later stage of project.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

END OF SECTION

This page intentionally left blank

Section 09 2236
Lath

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal lath for portland cement plaster.

B. Metal lath for manufactured brick masonry.

1.02 RELATED REQUIREMENTS

A. Section 04 2613 - Masonry Veneer

B. Section 07 2100 - Board and Batt Insulation

C. Section 07 2500 - Weather Barriers: Water-resistive barrier under exterior plaster and stucco.

D. Section 09 2116 - Gypsum Board Assemblies: Sheathing on exterior walls.

1.03 REFERENCE STANDARDS

A. ASTM C847 - Standard Specification for Metal Lath; 2014a.

B. ASTM C933 - Standard Specification for Welded Wire Lath; 2014.

C. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

D. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

E. ASTM C1032 - Standard Specification for Woven Wire Plaster Base; 2014.

F. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2016a.

1.04 SUBMITTALS

A. See Section 01 3300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Lath and Accessories:
   1. Cemco: www.cemcosteel.com.
   2. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
   3. Structa Wire Corporation; Structa Mega Lath: www.structawire.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRAMING AND LATH ASSEMBLIES

A. Provide completed assemblies with the following characteristics:
   1. Maximum Deflection of Vertical Assemblies: 1:360 under lateral point load of 100 lbs.
   2. Maximum Deflection of Horizontal Assemblies: 1:240 deflection under dead loads and wind uplift.

2.03 LATH

A. Diamond Mesh Metal Lath: ASTM C847, galvanized; self-furring.
   1. Weight: To suit applicationcomply with deflection criteria and as specified in ASTM C841 or ASTM C1063 for framing spacing.
   2. Weight: 2.5 lb/sq yd.

B. Ribbed Metal Lath: ASTM C847, galvanized; 3/8 inch thick.
   1. Weight: To suit application_____ and as specified in ASTM C841 or ASTM C1063 for framing spacing.
   2. Weight: 3.4 lb/sq yd.
   3. Backed with treated paper.
   4. Location: At all horizontal surfaces

C. Corner Mesh: ASTM C1063; Formed sheet steel, minimum 0.018 inch thick, perforated flanges shaped to permit complete embedding in plaster, minimum 2 inch size; same finish as lath.

D. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, and maximum possible lengths.
   1. Material: Formed sheet steel with rust inhibitive primer, expanded metal flanges.
   2. Casing Beads with Weep Holes: Square edges.
   3. Corner Beads: Radiused corners.
   4. Base Screeds: Beveled edges.
   5. Control Joints: Accordion profile with factory-installed protective tape, 2 inch flanges.

E. Refer to Section 04 7200 for metal lath requirements at cast stone masonry.

2.04 ACCESSORIES

A. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.

B. Fasteners: Self-piercing tapping screws; ASTM C1002 or ASTM C954.

C. Tie Wire: Annealed galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that substrates are ready to receive work and conditions are suitable for application.

C. For exterior plaster and stucco on stud walls, verify that water-resistive barrier has been installed over sheathing substrate completely and correctly; see Section 07 2500.

D. Do not begin until unacceptable conditions have been corrected.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION - GENERAL

A. Install metal lath and furring for Portland cement plaster in accordance with ASTM C1063.

B. Install lath and furring for fire-rated assemblies in accordance with requirements of assembly as indicated.

3.03 CONTROL JOINT INSTALLATION

A. Locate joints as indicated on drawings and comply with ASTM C1063.

3.04 LATH INSTALLATION

A. Apply lath taut, with long dimension perpendicular to supports.

B. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.

C. Place corner bead at external wall corners; fasten at outer edges of lath only.

D. Place base screeds at termination of plaster areas; secure rigidly in place.

E. Place 4 inch wide strips of lath centered over junctions of dissimilar backing materials, and secure rigidly in place.

F. Place lath vertically above each top corner and each side of door frames to 6 inches above ceiling line.

G. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.

H. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.05 TOLERANCES

A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet.

B. Maximum Variation from True Position: 1/8 inch.

END OF SECTION

Section 09 2400
Cement Plastering

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cement plastering.

1.02 RELATED REQUIREMENTS

A. Section 04 7200 - Cast Stone Masonry

B. Section 07 2500 - Weather Barriers: Water-resistive barrier.

C. Section 09 2236 - Lath: Lath, furring, beads, screeds, and joint accessories for plaster base.

1.03 REFERENCE STANDARDS

A. ASTM C91/C91M - Standard Specification for Masonry Cement; 2018.

B. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.

C. ASTM C206 - Standard Specification for Finishing Hydrated Lime; 2014.

D. ASTM C897 - Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters; 2015.

E. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster; 2015b.

F. ICC (IBC) - International Building Code; 2015.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittals procedures.

B. Product Data: Provide data on plaster materials and trim accessories.

C. Samples:
   1. Submit two samples, 36 by 36 inch in size illustrating finish color and texture.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

A. Exterior Plaster Work: Do not apply plaster when substrate or ambient air temperature is 40 degrees F or lower, or when temperature is expected to drop below 40 degrees F within 48 hours of application.

PART 2 PRODUCTS

2.01 CEMENT PLASTER APPLICATIONS

A. Lath Plaster Base: Metal lath.
   1. Plaster Type: Factory prepared plaster mix.
   2. Number of Coats: Three.
   3. First Coat: Apply to a nominal thickness of 3/8 inch.
   4. Second Coat: Apply to a nominal thickness of 3/8 inch.
   5. Finish: Acrylic.

B. Lath Veneer Base: Metal lath.
   1. Plaster Type: Factory prepared plaster mix.
   2. Number of Coats: Two.
   3. First Coat: Apply to a nominal thickness of 3/8 inch.
   4. Second Coat: Apply to a nominal thickness of 3/8 inch.
   5. Finish: Masonry veneer - refer to 04 2613 - Masonry Veneer

2.02 FACTORY PREPARED CEMENT PLASTER

A. Exterior Portland cement plaster system made of scratch and brown base coat, leveling coat with reinforcing mesh, and acrylic finish coat; install in accordance with ASTM C926.
   1. Manufacturers:
      a. LaHabra; Fiber-47 Scratch and Brown: www.lahabrastucco.com.
      b. Master Builders Solutions; Stucco Base: www.master-builders-solutions.com/en-us
      c. Parex USA, Inc; Armourwall 300: www.parexusa.com/#sle.

B. Premixed Textured Coating: Polymer modified acrylic coating, integrally colored, and trowel applied to substrates prepared in accordance with manufacturer's written installation instructions.
   1. Color: As indicated on drawings.
   2. Manufacturers:
      a. Parex USA Inc; AquaSol Sand Smooth: www.parex.com
      b. La Habra; Prema-Flex smooth:www.lahabrastucco.com
      c. Sto Corp; Stolit Lotusan, Fine: www.stocorp.com/#sle.

2.03 JOBSITE MIXED CEMENT PLASTER

A. Materials:
   1. Portland Cement: ASTM C150/C150M, Type I.
   2. Masonry Cement: ASTM C91/C91M, Type N.
   3. Lime: ASTM C206 Type S.
   4. Sand: Clean, well graded, and complying with ASTM C897.
   5. Water: Clean, fresh, potable, and free of mineral or organic matter that could adversely affect plaster.

B. Plaster Mixes: Proportioned in accordance with ASTM C926; parts by volume.
   1. First Coat Over Lath:
      a. Plaster Mix "CM": One part Portland cement, and one part Type N masonry cement.
      b. Minimum 2-1/2 parts and maximum 4 parts sand, per total volume of cementitious materials.

2.04 ACCESSORIES

A. Lath: See Section 09 2236.

B. Reinforcing Mesh: 4.5 oz/sq yd alkali-resistant mesh.

C. Water-Resistive Barrier: See Section 07 2500.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are properly in place.

C. Verify mechanical and electrical equipment and services located within areas to receive this work have been properly tested and approved.

3.02 Mixing

A. Mix only as much plaster as can be used prior to initial set.

B. Mix materials dry, to uniform color and consistency, before adding water.

C. Protect mixtures from frost or freezing temperatures, contamination, and excessive evaporation.

3.03 APPLICATION

A. Apply plaster in accordance with manufacturer's written instructions and comply with ASTM C926.

B. Base Coats:
   1. Apply base coat(s) to fully embed lath and to specified thickness.
   2. Follow guidelines in ASTM C926 and manufacturer's written installation instructions for moist curing base coats and application of subsequent coats.

C. Leveling Coat:
   1. Apply leveling coat to specified thickness.

D. Finish Coats:
   1. Primer and Acrylic Coatings:

a. Remove surface contaminants such as dust and dirt without damaging substrate.
b. Apply primer in accordance with manufacturer's instructions.
c. Apply finish coating in number of coats and to thickness recommended by manufacturer.

3.04 TOLERANCES

A. Maximum Variation from True Flatness: 1/4 inch in 10 feet.

3.05 REPAIR

A. Patching: Remove loose, damaged or defective plaster and replace with plaster of same composition; finish to match surrounding area.

END OF SECTION

Section 09 2523
Lime Based Plastering

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior lime based plastering.

1.02 Related Requirements

1.03 Reference Standards

A. ASTM C35 - Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster; 2001 (Reapproved 2014).

B. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

C. ASTM C842 - Standard Specification for Application of Interior Gypsum Plaster; 2005 (Reapproved 2010).

D. SOI Standards and Guidelines for Preservation - The Secretary of the Interior's Standards for the Treatment of Historic Properties; 2017.

1.04 Submittals

A. See Section 01 3300 - Submittals for submittals procedures.

B. Product Data: Submit manufacturer's product data and installation instructions for systems specified, demonstrating compliance with requirements.

C. Samples:
   1. Plaster Finish: Submit 12 inch by 36 inch sample of each required plaster finish. Divide each panel into thirds to illustrate each coat.
      a. Mount on plywood or hardboard using standard lath as a key.
      b. Sample shall include viewing pane head and jamb conditions

D. Conservation treatment quality control plan.

E. Manufacturer's qualification statement.

F. Plasterwork restorer's qualification statement.

1.05 Quality Assurance

A. Conservation Treatment Quality Control Plan: Prior to commencing work of this section, receive written approval of plan of proposed restoration work. Include the following:

1. Describe methods of protecting surrounding construction and landscape features.
2. Describe sequencing, work procedures, materials, and tools proposed for each type of conservation treatment specified.
    a. Include effects of likely weather variations on sequencing of treatments, overall construction schedule, and protection methods for completed work.
3. Describe methods for surveying original plasterwork.
4. Describe methods and approach to assure repair materials' matching and compatibility with original building materials.
5. Conservation plan to be reviewed and approved by City, Architect, and Historical Consultant prior to commencement of the work .

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least ten years of documented experience.

C. Plasterwork Restorer Qualifications: Company specializing in period plaster restoration with minimum ten years of documented experience.
1. Plastering Mechanics: Experienced, with demonstrated proficiency in lime plaster on historic adobe structures.
2. Experience based solely on application of veneer plaster, gypsum plaster, or cement plaster is not sufficient.
3. Minimum year requiement may be waived upon submittal of qualifications to the installer and approval by the City, Architect, and Historical Consultant.

D. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.06 MOCK-UPs

A. Provide one mock-up panel 48 inches wide by 48 inches tall using existing exposed masonry wall as substrate to show workmanship and method of blending new work with existing plaster.
1. Divide panels into three sections:
    a. Install base coat on the entire panel.
    b. Install second coat full height of panel by width of panel less approximately 9 inches.
    c. Install finish coat full height of panel by panel width less approximately 18 inches.
    d. Cure mock-up for two weeks using procedures appropriate for weather conditions. Obtain Architect's review and approval.
    e. If the review requires rework, prepare second mock-up panel of the same dimensions and characteristics as the first and incorporate Architect’s review comments.

B. Locate where directed.

C. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original and unopened packaging, with brand names and manufacturer's labels intact and legible.

B. Store materials in dry location, fully protected from weather.

1.08 Field Conditions

A. Weather Requirements:
   1. Do not apply plaster when ambient temperature is less than 40 degrees F.
   2. Do not

PART 2 - PRODUCTS

2.01 Materials

A. Hydraulic Hydrated Lime:
   1. Manufacturers:
      a. Saint Astier; Natural Hydraulic Lime NHL 3.5: www.stastier.com/#sle.
      b. Substitutions: As approved by Architect and Histroic Consultant

B. Aggregate for Base Coats: Natural sand complying with ASTM C35.

C. Aggregate for Finish Coats: ASTM C842.

D. Lath and Accessories:
   1. Lath: Open veave, self-furring, glass fiber reinforcing lath
      a. Manufacgturer: Master Builders Solutions
      b. Product: PermaLath 1000
      c. Color: Grey
      d. Thickness: 1/4" nominal
   2. Fasteners: Nails, staples, or other approved metal supports, of type and size to suit application, compatible with lath and plaster, and rigidly securing lath and accessories in place.
      a. 3" deck screws with 1/4" fender washers galv. or zinc coated
   3. Viewing Frame
      a. 2"x4" nominal clear vertical grain heart redwood
      b. Glazing: 1/8" think clear Lexan
      c. Anchors: As indicated on the plans

E. Plaster Mixing:
   1. Mix materials in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.01 Monitoring

A. Monitoring shall be performed by a qualified historian during the preservation process. Historian my stop work if not in accordance with the contract documents and approved Conservation Treatment Quality Control Plan.

3.02 Examination

A. Areas of full or partial removal of existing plaster are indicated on drawings.

B. Examine areas indicated for removal and sound them out to confirm extent of work. Additional sections of existing plaster may have deteriorated subsequent to issuance of Contract Documents.

C. Sound out existing plaster to determine extent of hollow, separated installation. Mark extent of hollow, separated installation of existing surfaces .
   1. Assist Architect and Historical Consultant in examining marked area to confirm extent of area requiring full or partial removal.

3.03 Existing Plaster Removal

A. In areas indicated, remove existing plaster to expose underlying masonry substrate.

B. Select, employ, and control methods of removal.
   1. Do not remove sound plaster.
   2. Protect substrate and adjacent materials to remain from damage.
   3. Provide scoured or fractured aggregate face on plaster to remain.
   4. Leave square-edged profile, 75 degrees to 105 degrees measured between plane of wall and edge thickness, between areas of partial depth and full depth removal.

C. Do not use power-operated grinders.

3.04 Plaster Mixing on Site

A. Mix plaster in accordance with manufacturer's instructions. Do not add water or other materials unless recommended by the manufacturer to obtain desired workability.

3.05 Plaster Application

A. General:
   1. All work shall comply with the SOI Standards and Guidelines for Preservation and National Park Service Preservation Briefs and Preservation Tech Notes referenced in Applied Earthworks Phase 1 Report.
   2. Comply with lime manufacturer's instructions.
   3. Comply with application recommendations in Conservation Treatment Quality Control Plan.

B. Prefill depressions or low areas in masonry substrate with coats of plaster applied not greater than 3/8 inch nominal to level the surface prior to applying plaster coats.

C. Install coats as follows:
   1. First or Scratch Coat: 1/8-3/16-inch nominal thickness.
   2. Second, Strengthening, or Brown Coat: 5/8-3/4-inch nominal thickness.
   3. Top or Finish Coat: One layer of 3/16-3/8-inch nominal thickness.
      a. Surface Texture: Match Exiting
   4. After consolidating the scratch coat and when thumbprint hard, scratch the surface to provide key for subsequent coat.
   5. Compact each base coat using a wood float. Rewet, by misting, and float brown coat at least twice to consolidate mortar during drying. Float to open-grained surface to provide sufficient key for finish coat.

6. Float finish coat to compact and provide uniform texture and color finish. Do not overwork. Patch minor imperfections by floating small quantities of fairly dry finish coat mixture into the surface.
7. Uniformity:
   a. Obtain uniform color within the limits of color variation, as determined by the Architect.
8. Tolerances: Deviation from plane not to exceed 1/8 inch in 10 feet, measured with a straightedge at any location on surface.
9. Curing:
   a. Allow approximately one to three weeks or more curing time between coats according to temperature and humidity.
   b. Rewet cured coats before applying subsequent coats.
10. Final Wash Coat: Apply lime wash to surface in three coats, allowing for suction during application and drying between coats.

3.06 Jointing

A. Do not bridge expansion or control joints.

3.07 Curing

A. Protect plaster against uneven and excessive evaporation of moisture and from strong, dry airflow.
   1. Apply and cure plaster as required by climatic and job conditions to prevent drying out during curing period.
   2. Cover with plastic sheeting to protect from frost, heavy rain, strong winds, and direct sunlight for minimum of 72 hours after application.
   3. Mist plaster surfaces three times per day - morning, noon, and evening - to ensure plaster environment remains at 90 percent relative humidity during the first 72 hours of curing each coat.
   4. Do not use commercial curing compounds.

3.08 Adjusting

A. Corrective Measures: Cut out and replace defective areas and repair to match acceptable work.
   1. Defective Work: Includes, but is not limited to:
      a. Areas showing cracks, dents, crazing, blisters, and other surface imperfections.
      b. Areas where bond to substrate has failed.

3.09 Cleaning

A. Remove and discard temporary protection after plaster work in each area has been completed. Remove plaster from other exposed surfaces, leaving them in undamaged condition; dispose of packaging materials and plaster debris.

END OF SECTION

This page intentionally left blank

Section 09 3000
Tiling

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for wall applications.

B. Cementitious backer board as tile substrate.

C. Ceramic accessories.

D. Ceramic trim.

E. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry Concrete Masonry Walls

B. Section 09 2400 - Cement Plastering: Lath and Portland cement scratch coat, where required by the TCNA (HB) Method specified.

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium).; 2017.

B. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2012.

C. ASTM C847 - Standard Specification for Metal Lath; 2014a.

D. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

E. Installer's Qualification Statement:
   1. Submit documentation of National Tile Contractors Association (NTCA) or Tile Contractors' Association of America (TCAA) accreditation.

F. Maintenance Materials: Furnish the following for City's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Tile: 2 percent of each size, color, and surface finish combination, but not less than 10 of each type.

1.06 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136 and TCNA (HB) on site.

B. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.
      a. Accredited Five-Star member of the National Tile Contractors Association (NTCA) or Trowel of Excellence member of the Tile Contractors' Association of America (TCAA).

1.07 MOCK-UPs

A. See Section 01 4000 - Quality Requirements for general requirements for mock-up.

B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
   1. Minimum size of mock-up is indicated on drawings.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: All products by the same manufacturer.

1. Dal-Tile Corporation: www.daltile.com/#sle.
2. Substitutions: See Section 01 6000 - Product Requirements.

B. Gauged Porcelain Tiles and Panels/Slabs: ANSI A137.3 standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
2. Size: 12 inch by 24 inch, nominal.
3. Thickness: 3/8 or 7/16 inch.
4. Edges: Square.
5. Surface Finish: Polished and Unpolished .
   a. Field Finish: Polished
   b. Accent Finish: Unpolisehd
6. Color(s): White UC10.
7. Grout Joint Width: 1/8"
8. Grout Color: As selected by architect form manufacturer's full range.
9. Pattern: As indicated on the drawings.
10. Products:
    a. Dal-Tile Corporation; Uniform Concrete: www.daltile.com/#sle.

2.02 TRIM AND ACCESSORIES

A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.

B. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
1. Applications:
   a. Open Edges: Bullnose.
   b. Inside Corners: Jointed.
   c. Floor to Wall Joints: Cove base.
2. Manufacturers: Same as for tile.

C. Non-Ceramic Trim: Brushed stainless steel, style and dimensions to suit application, for setting using tile mortar or adhesive.
1. Manufacturers:
   a. Schluter-Systems: www.schluter.com/#sle.

2.03 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:
1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
2. Custom Building Products: www.custombuildingproducts.com/#sle.
3. Substitutions: See Section 01 6000 - Product Requirements.

C. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.
1. Applications: Use this type of bond coat where Large and Heavy Tile (LHT) mortar is indicated.

2.04 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:
   1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
   2. Custom Building Products: www.custombuildingproducts.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

C. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
   1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
   2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
   3. Color(s): As selected by Architect from manufacturer's full line.

2.05 THICK-BED MATERIALS

A. Mortar Bed Materials: Portland cement, sand, latex additive, and water.

B. Cleavage Membrane: No. 15 asphalt saturated felt.

C. Membrane at Walls: No. 15 asphalt saturated felt.

D. Metal Lath: ASTM C 847, Flat diamond mesh, of weight to suit application, galvanized finish.

2.06 ACCESSORY MATERIALS

A. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 7/16 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

B. Verify that required wall-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install ceramic accessories rigidly in prepared openings.

G. Install non-ceramic trim in accordance with manufacturer's instructions.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive.

J. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - WALL TILE

A. On interior walls install in accordance with TCNA (HB) Method W201, mortar bed over concrete and masonry with waterproofing membrane.

3.05 CLEANING

A. Clean tile and grout surfaces.

3.06 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

3.07 SCHEDULE

END OF SECTION

Section 09 9113
Exterior Painting

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Exposed steel surfaces such as structural steel elements
   3. Exposed galvanized metal surfaces such as sheet metal flashing, vents, and trim.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
   6. Floors, unless specifically indicated.
   7. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
   8. Glass.
   9. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Section 01 8113 - Sustainable Design Requirements – LEED for Homes, including VOC restrictions

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2018.

B. ASTM C410 - Standard Specification for Industrial Floor Brick; 2013.

C. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

D. ASTM D2369 - Standard Test Method for Volatile Content of Coating; 2010, with Editorial Revision (2015).

E. ASTM D6490 - Standard Test Method for Water Vapor Transmission of NonFilm Forming Treatments Used on Cementitious Panels; 1999.

F. ASTM D7089 - Standard Practice for Determination of the Effectiveness of Anti-Graffiti Coating for Use on Concrete, Masonry and Natural Stone Surfaces by Pressure Washing; 2021.

G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2021.

H. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

I. South Coast Air Quality Management District (SCAQMD) Rule 1113.

J. SSPC-SP 1 - Solvent Cleaning; 2015.

K. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.05 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

B. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished metals and roof tiles, have been approved.

C. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer.

B. Paints:
1. Base Manufacturer: Dunn Edwards Paints, www.dunnedwards.com
2. Behr Process Corporation: www.behr.com/#sle.
3. PPG Paints: www.ppgpaints.com/#sle.
4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

2.02 PAINT SYSTEMS - EXTERIOR

A. Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including primed metal and plaster.
1. Two top coats and one coat primer.
2. Top Coat(s): Exterior Latex.
    a. Products:
        1) Dunn Edwards EVERSHIELD, Exterior Flat Paint (EVSH10)
        2) Dunn Edwards EVERSHIELD, Exterior Velvet Paint (EVSH20)
        3) Dunn Edwards EVERSHIELD, Exterior Eggshell Paint (EVSH30)
        4) Dunn Edwards EVERSHIELD, Exterior Low Sheen Paint (EVSH40)
        5) Dunn Edwards EVERSHIELD, Exterior Semi-Gloss Paint (EVSH50)
        6) Dunn Edwards EVERSHIELD, Exterior Gloss Paint (EVSH60)

7) Behr Premium Plus Exterior Flat [No. 4050]. (MPI #10)
8) Behr Premium Plus Exterior Satin Enamel [No. 9050]. (MPI #15)
9) Behr Premium Plus Exterior Semi-Gloss Enamel [No. 5050].
10) Behr Premium Plus Interior/Exterior Hi-Gloss Enamel [No. 8050]. (MPI #119)

3. Primer: As recommended by top coat manufacturer for specific substrate.

2.03 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Water and Graffiti- Resistant Treatment: Use clear-drying, penetrating, water-based silicone emulsion for weatherproofing masonry materials and protecting them from graffiti attacks without altering their natural appearance.
1. Properties:
a. Total Solids per ASTM D2369: Minimum Nine (9) percent.
b. Comply withCalifornia VOC regulations.
c. Water Absorption Reduction (Brick) per ASTM C67/C67M: Greater than 96 percent.
d. Water Absorption Reduction (CMU) per ASTM C410:
1) Heavy Weight CMU: Greater than 89 percent.
2) Split Face CMU: Greater than 95 percent.
e. Water Vapor Transmission per ASTM E96/E96M:
1) Clay Brick: Greater than 85 percent.
2) Concrete Block: Greater than 95 percent.
3) Mortar: Greater than 95 percent.
f. Water Vapor Transmission WVT per ASTM D6490: Minimum 88 percent retention.
g. Cleanability Level 2 per ASTM D7089
2. Products:
a. PROSOCO, Inc; Sure Klean Weather Seal Blok-Guard & Graffiti Control VOC 9: prosoco.com
b. Or approved equal
c. Substitutions: Section 01 6000 - Product Requirements.

C. Patching Material: Latex filler.

D. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Exterior Plaster and Stucco: 12 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Exterior Plaster: Fill hairline cracks, small holes, and imperfections with exterior patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

G. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

H. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

END OF SECTION

Section 10 1313
Electronic Directories

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Freestanding electronic display directory

1.02 RELATED REQUIREMENTS

A. Division 26 0000 - Electrical: Conduits and conductors

B. Division 27 0000 - Communications: Communications systems

C. Section 32 1313 - Concrete Paving: Base for directories including anchor bolts.

1.03 REFERENCE STANDARDS

A. ANSI/Infocomm 10 - Audiovisual Systems Performance Verification; 2013.

B. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact); 1993 (Reapproved 2010).

C. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test; 2009.

D. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test; 2005 (Reapproved 2011).

E. BS EN 60529 - Degrees of protection provided by enclosures (IP Code); 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting two weeks prior to the start of the work of section 32 1313 - Concrete Paving ; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets on electronic directory systems including recommendations for preparation, storage and handling, and installation.

C. Shop Drawings: Indicate cable routing, connections between equipment, anchor and support details, and adjacent construction.

D. System Setting Backup: Provide an electronic file of all system settings.

E. Security Items:
   1. Provide four sets of keys for each locked equipment enclosure.
   2. Provide passwords to access control functions for hardware and software user interfaces.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

B. Authorized Manufacturer Representative: System shall be configured and commissioned by an authorized manufacturer representative.

1.07 DELIVERY, STORAGE, AND HANDLING

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for video and control system with full replacement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. TouchSource; Frontier Single Display; touchsource.com (Basis of Design)

B. I & E Company; iekiosk.com

C. Eflyn ; eflyn.com

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANELIZED LED VIDEO DISPLAY

A. Performance Requirements:
   1. Comply with performance standards based on tests conducted in accordance with ANSI/Infocomm 10.
   2. Display shall be IP 65 rated per BS EN 60529

B. Display Type : Flat.
   1. Scree Size: 55 inch diagonal
   2. Screen Type: Touch Screen
   3. Native Resolution: 1,920 x 1,080 (Full HD)
   4. Pixel Pitch: 0.63 mm
   5. Horizontal Viewing Angle: 170 degrees (plus/minus 85 degrees off center).
   6. Vertical Viewing Angle: 160 degrees (plus/minus 80 degrees off center).
   7. Brightness: 2500 Nits
   8. Color Gamut: 72%
   9. Mount Type: Free Standing/Self Supporting.

10. Location: Outdoor.
11. Aspect Ratio:16:9
12. Surface Treatment: Haze 3%, Quarter wave plate (allows viewing with polarized lenses)
13. Data Connections: RS232C, RJ45, or HDBaseT.
14. Input Source Compatibility: HDMI, USB, and HDBaseT.
15. Power Consumption: 310 watts typical, 450 watts maximum, 170 watts in energy saving mode.
16. Working Voltage: 120 VAC / 240 VAC at 60Hz.
17. Heat Flow: 1,536 BTU (maximum).

C. Products:
1. Samsung OH55F
2. LG XE4F-M

2.03 DISPLAY CONTROL UNIT

A. Interface Unit:
1. Cooling: Passive fanless with cooling plates
2. Display Driver: 8k up to 7680x4320 pixels
3. Memory: SSD
4. Working Voltage: 120 VAC / 240 VAC at 60Hz.

B. Products:
1. Aopen DEX5750

2.04 DISPLAY CABINET

A. Construction:
1. Material: Aluminum
2. Base: 1/2 inch thick
3. Frame: 1/8 inch
4. Gussets and reinforcing at hinges: 1/8 inch and 1/4 inch
5. Cover panels: 0.09 inch
6. Lower removeable cover panel: .125 inch

B. Features:
1. Access Panel: fully gasketed
2. Locking: Two nickel plated keyed alike plunger locks
3. Ventilation: Intake at bottom with vents on sides and top
   a. Fans: Two 80mm computer fans mounted on vibration isolators
4. Power: Internal J-box with 1/2 inch threaded inlets and clear in use cover
5. Control Unit Enclosure: Control unit shall be enclosed within an IP 66 rated cabinet within the display cabinet.

C. Finish:
1. Powder coated polyester with the following cured film propterties
   a. Impact resistance
      1) Direct: 100 inch pounds minimum per ASTM D2794
      2) Indirect: 100 inch pounds minimum per ASTM D2794
   b. Pencil Hardness: 2H per ASTM D3363
   c. Cross Hatch Adhesion: 4B per ASTM D3359

2. Finish to be protected by clear polyester overcoat for exterior use.
3. Colors: As selected by Architect from coating manufactuers full line of available colors and finishes including metalics and hammertones.

2.05 CONTENT MANAGEMENT

A. Directory to include content management system
   1. All management of the digital directory must be done centrally through a Centralized Cloud Based or hosted password authenticated server.
   2. All listings and content must be backed up to a secondary or "cloud-based" location for redundancy.
   3. Vendor must offer and support unlimited cloud-based backups & hosting.
   4. Content updating should be designed for ease of use through common sets of requirements including:
      a. All content updating should be designed to be executed by non-technical staff with contextual help for the operator.
      b. Operators must be able to instantly update messaging with Real Time messaging takeover.
      c. Must be able to have unlimited user accounts for updating with no additional cost for additional updating licenses.

B. Security Requirements:
   1. Administrator access should be capable of multi-factor authentication processes.
   2. All communication from the client-side device must be outbound only over HTTPS or other encrypted protocols.
   3. Onsite client devices must be deployed on an operating system that can be customized to limit all unnecessary applications, protocols, and ports.
   4. All remote access must be initiated via outbound-only communication and via HTTPS or similar secure connectivity.

C. Software Support
   1. Systems must be capable of notification to a US-based support desk in the event of an outage or downtime event.
   2. Must provide US-based support answered by English speaking operators with technical skills to support the products.
   3. Must be able to provide a 5 year software support contract option.
   4. Support software must auto-detect when media player or program is non-functional and notify support desk.
   5. Vendor must provide unlimited access to software updates, patches, and upgrades while supported by the installed media players.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates and support structure is in place and properly prepared.

B. Verify that required power and data sources are provided.

C. Notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Do not proceed with installation until support structure and substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions .

B. Install electronic directories level and plumb with fasteners reccommended by the manufacturer.

3.04 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation and maintenance of equipment to City's designated representative.

3.05 PROTECTION

A. Protect installed products from subsequent construction operations.

END OF SECTION

This page intentionally left blank

Section 10 1400
Signage

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room and door signs.

1.02 REFERENCE STANDARDS

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

B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

C. CBC Chapter 11B - California Building Code - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing; 2022.

D. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.03 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information from City through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   3. Submit for approval by City through Architect prior to fabrication.

C. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

1.04 QUALITY ASSURANCE

1.05 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store tape adhesive at normal room temperature.

1.06 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Flat Signs:
   1. Best Sign Systems, Inc: www.bestsigns.com. Basis of Design
   2. Mohawk Sign Systems, Inc: www.mohawksign.com/#sle.
   3. Seton Identification Products: www.seton.com/aec.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with CBC Chapter 11B, ADA Standards, and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
   1. Sign Type: Flat signs with engraved panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
   3. Character Height: 1 inch.
   4. Sign Height: 2 inches, unless otherwise indicated.
   5. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
   6. Rest Rooms: Identify with pictograms, the names "MEN", "WOMEN" and duplicate in braille.
      a. Verify gender identity signage for restrooms with city and architect prior to fabrication.

2.03 SIGN TYPES

A. Flat Signs: Signage media without frame.
   1. Edges: Square.
   2. Corners: Square.
   3. Wall Mounting of One-Sided Signs: Tape adhesive.

B. Color and Font: Unless otherwise indicated:
   1. Character Font: As selected by the city.
   2. Character Case: Upper case only.
   3. Background Color: As selected by City.

4. Character Color: Contrasting color.

2.04 TACTILE SIGNAGE MEDIA

A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
   1. Total Thickness: 1/16 inch.

B. Applied Character Panels: Acrylic plastic base, with applied acrylic plastic letters and braille.
   1. Total Thickness: 1/8 inch.
   2. Letter Thickness: 1/8 inch.
   3. Letter Edges: Square.

2.05 ACCESSORIES

A. Exposed Screws: Stainless steel.

B. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs and mount at heights indicated on drawings and in accordance with CBC Chapter 11B, ADA Standards and ICC A117.1.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

3.03 FIELD INSPECTION

A. Per CBC Chapter 11B signs and identification devices shall be field inspected after installation and approved by the enforcing agency prior to the issuance of a final certificate of occupancy per Chapter 1, Division II, Section 111, or final approval where no certificate of occupancy is issued. The inspection shall include, but not be limited to, verification that Braille dots and cells are properly spaced and the size, proportion and type of raised characters are in compliance with these regulations.

END OF SECTION

This page intentionally left blank

Section 10 2113.17
Phenolic Toilet Compartments

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Phenolic toilet compartments.

1.02 RELATED REQUIREMENTS

A. Section 10 2800 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

B. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide data on panel construction, hardware, and accessories.

C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

D. Samples: Submit two samples of partition panels, 4 by 4 inch in size illustrating panel finish, color, and sheen.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Phenolic Toilet Compartments:
   1. Partition Systems International of South Carolina; Phenolic Toilet Partitions: www.psisc.com/#sle.
   2. Substitutions: Section 01 6000 - Product Requirements.

2.02 PHENOLIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid phenolic core panels with through color, floor-mounted headrail-braced.
   1. Color: Black

2. Fire Rating: Class A

B. Doors:
1. Thickness: 3/4 inch.
2. Width: 24 inch.
3. Width for Handicapped Use: 36 inch.
4. Height: 72 inch. Set 6" above finsih floor

C. Panels:
1. Thickness: 3/4 inch.
2. Height: 72 inch. Set 6" above finsih floor

D. Pilasters:
1. Thickness: 1 inch.
2. Width: As required to fit space; minimum 4 inch.

2.03 ACCESSORIES

A. Pilaster Shoes: Formed ASTM A666 Type 304 stainless steel with No. 4 finish, 3 inch high, concealing floor fastenings.
1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Hollow stainless steel, 1 inch by 1-1/2 inch size, with anti-grip profile and cast socket wall brackets.

C. Wall and Pilaster Brackets: Satin stainless steel; manufacturer's standard type for conditions indicated on drawings.

D. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.

E. Hardware: Satin stainless steel:
1. Pivot hinges, gravity type, adjustable for door close positioning.
a. 14 ga. stainless steel
b. Provide self closing hinges at accessible stall
2. Door Latch: Slide type with exterior emergency access feature. Cast Stainless Steel
3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
4. Coat hook with rubber bumper; one per compartment, mounted on door.
a. Mount at accessible reach range in accessible stall
5. Door Pull: Stainless Steel.
a. Provide accessible door pull at both sides of door at accessible stall

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

This page intentionally left blank

Section 10 2800
Toilet, Bath, and Laundry Accessories

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Under-lavatory pipe supply covers.

C. Electric hand/hair dryers.

D. Utility room accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 3514 - LEED Credit Summary

B. Section 01 3515 - LEED Certification Procedures

C. Section 06 1000 Rough Carpentry: Concealed supports for accessories, including in wall framing and plates.

D. Section 09 3000 - Tiling

E. Section 10 2113.19 - Plastic Toilet Compartments.

F. Section 22 0000 Plumbing: Toilet and lavatory fixtures

1.03 REFERENCE STANDARDS

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

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

E. ASTM C1036 - Standard Specification for Flat Glass; 2011.

F. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Provide LEED submittal forms with the product submittal for each different product and manufacturer. Recycled content, regional distance and materials costs must be identified for each manufacturer and product. Submittals without the LEED forms will be rejected as incomplete. Refer to Specification Section 01 3516 – LEED Submittal Forms.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Bobrick.

B. Commercial Toilet, Shower, and Bath Accessories:
1. ASI - American Specialties, Inc: www.americanspecialties.com.
2. Bradley Corporation: www.bradleycorp.com.

C. Electric Hand/Hair Dryers:
1. American Dryer, Inc: www.americandryer.com.
2. Excel Dryer: www.exceldryer.com.
3. World Dryer Corporation; Basis of Design: www.worlddryer.com.
4. Bobrick Washroom Equipment Inc.: www.bobrick.com

D. Provide products of each category type by single manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Stainless Steel Sheet: ASTM A666, Type 304.

C. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

D. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.

2.04 Commercial Toilet Accessories

A. Toilet Paper Dispenser: Double roll, surface mounted bracket type, stainless steel, spindleless type for tension spring delivery designed to prevent theft of tissue roll.
   1. Products:
      a. Product: B-4288 manufactured by [Bobrick]

B. Electric Dryers: Traditional fan-in-case type, with downward nozzle.
   1. Style: High speed, energy efficient, fixed nozzle.
   2. Cover: Stainless steel with brushed finish.
   3. Heater: Capible of rasing 70 degree ambient air to 130 degrees.
   4. Fan Control: Hi/low speed switch
   5. Total Wattage: 950, maximum.
   6. Air Filter: HEPA to remove contaminants 0.3 microns or larger
   7. Warranty: 5 years.
   8. Product: Verdedri by Workd Dryer as Basis of Design

C. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and stainless steel tank and working parts; push type soap valve, check valve, and window refill indicator, key lock.
   1. Minimum Capacity: 40 ounces.
   2. Product: B-2111 manufactured by Bobrick.

D. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
   1. Tempered Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
   2. Size: 24 inches wide by 36 inches tall.
   3. Frame: 0.05 inchangle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
   4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
   5. Product: B-2908 manufactured by Bobrick.

E. Seat Cover Dispenser: Stainless steel, surface-mounted, reloading by concealed opening at base, tumbler lock.
   1. Minimum capacity: 250 seat covers.
   2. Product: B-221 as manufactured by Bobrick

F. Grab Bars: Stainless steel, smooth surface.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.
      b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Length and Configuration: As indicated on drawings.
      d. Products: B-5806 as manufactured by Bobrick

2.05 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Under-Lavatory Pipe and Supply Covers:
   1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
   2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
   3. Construction: 1/8 inch flexible PVC.
   4. Color: White.

2.06 Utility Room Accessories

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
   1. Hooks: 4, 0.06 inch stainless steel rag hooks at shelf front.
   2. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
   3. Length: 34 inches.
   4. Product: B-239 manufactured by Bobrick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

END OF SECTION

SECTION 22 0000

PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Related Documents:

1. The other Contract Documents complement the requirements of this Section and apply to this Section
2. Division 1 - General Requirements and Section 23 0013 apply to the Work of this Section.
3. Where requirements of this Section exceed those in other Contract Documents, Contractor shall comply with the requirements of this Section.

B. Codes and Regulations:

1. California Plumbing Code (CPC).
2. California Mechanical Code (CMC).
3. California Building Code (CBC).
4. California Green Building Standards Code (CGBSC).
5. California Electrical Code (CEC).
6. California Fire Code (CFC).
7. National Fire Code (NFC).
8. National Fire Protection Association (NFPA).
9. Local Building Department.
10. Local Fire Marshal.
11. California Energy Code (CEnC).
12. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirements will govern when so directed by the Architect.

C. Scope of Work: (Plumbing Section Division 15)

1. Material and labor including rough-in for and connection to fixtures, appliances and equipment are:
    a. WASTE AND VENT
        1. Soil piping
        2. Drain waste and vent piping (DWV)

3. Indirect waste piping
4. Wet vent piping
5. Floor drains.
6. Traps.
7. Vent flashings.

b. WATER

1. Potable water piping systems including, pressure reducing valves, relief valves, balancing valves, water hammer shock absorbers, air chambers.
2. Isolation, Zone and Control Valves.
3. Hot water systems including heaters and storage tanks.
4. Piping for water service.
5. Backflow preventers.
6. Disinfecting of water systems.
7. Insulation of piping and equipment for heat, sound, and vibration.

c. ALL PLUMBING FIXTURES AND SUPPORTS

1. Including, but not limited to:
   (a) Sinks, lavatories, water closets, service sinks, etc., - all materials
   (b) Supports (backing) for all plumbing fixtures and accessories
   (c) Installation of sinks in or part of drain boards - all materials

d. CONNECTIONS

1. Utilities-Sanitary sewer, storm drain, water, gas
2. Make-up water for heating and cooling systems
3. Hot water tanks
4. Temporary water, waste and air lines
5. The joining of pipe by any mode or method including, but not limited to, acetylene and arc welding, brazing, lead burning, plastics welding, soldering, wiped joints, caulked joints expanded or rolled joints, etc., used in connection with any of the work listed herein

e. LAYOUT AND CUTTING

1. Holes, chases, channels, the setting and erection of bolts, inserts, stands, brackets, stanchions, supports, sleeves, escutcheon plates, thimbles, hangers, conduits, and boxes.

f. EXCAVATION, TRENCHING AND BACKFILL

1. In connection with plumbing and piping work shown herein

g. TEMPORARY PIPING in connection with:

1. Building and construction work
2. Excavating and underground construction

h. PIPE HANGERS, SUPPORTS, ANCHORS, GUIDES, EXPANSION JOINTS

1. Including:

(a) Supports for equipment to which pipe is connected, such as tank supports

(b) Acoustical pipe isolation

(c) Isolators-dielectric and vibration

(d) Anchors and thrust blocks of concrete, metal, etc.

(e) Seismic bracing

(1) Anvil/Badger, Mason Industries, B-Line/TOLCO or approved equal.

(2) Seismic hanger system design shall comply with current CBC requirements and ASCE 7-05 and 7-10.

i. SIGNS AND NOTICES

j. ROOF FLASHINGS FOR PIPING PENETRATIONS

k. TESTS

1. Piping, for tightness
2. Equipment for performance
3. Operating instructions
4. Final operation

1.2 ACCESSIBLE PLUMBING FIXTURES

A. Accessible plumbing fixtures shall comply with all of the requirements of CBC Sections 11B-213, 11B-305, & 11B-308, 11B-Division 6.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the Work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. Welder's Qualifications: Comply with ASME B31.8. The pipe welder shall have a copy of a certified ASME B31.8 qualification test report. Contractor shall also conduct a qualification test. Submit each welder's identification symbols, assigned number, or letter, used to identify work of the welder. Affix symbols immediately upon completion of welds. Welders making defective welds after passing a qualification test shall be given a requalification test and, upon failing to pass this test, shall not be permitted to work this contract.

D. Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.

E. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

F. Comply with NSF 372, “Drinking Water System Components – Lead Content” for potable domestic water piping and components.

SUBMITTALS

G. Comply with pertinent provisions of Architectural Division 1 Sections.

H. Product Data: Within 35 calendar days after the Contractor has received the Notice to Proceed, submit 1 electronic PDF copy of the following to the Architect for approval prior to acquisition:

1. Materials list of items proposed to be provided under this Section.

2. Manufacturer's specifications, catalog cuts, and other data needed to prove compliance with the specified requirements. All pieces of equipment shall be clearly identified on corresponding manufacturer's literature being submitted.

3. Shop Drawings or other data as required to indicate method of installing and attaching equipment, except where such details are fully shown on the Drawings.

4. Submittals for the entire project shall be submitted at the same time or may be rejected until all are included in one submittal package.
5. Submittals shall be provided electronically in PDF format, bookmarked by design tags for equipment and specification sections for materials. Incomplete or noncompliant submittals may be rejected.

1.4 DESIGN CHANGES CAUSED BY PRODUCT SUBSTITUTIONS

A. Contractor shall pay costs of design and installation for changes resulting from substitution of alternate products.

B. Acceptance of alternate products by Architect does not change this requirement.

1.5 PRODUCT HANDLING

A. Comply with pertinent provisions of Architectural Sections.

B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

PART 2 - PRODUCTS

2.1 WASTE, VENT, SEWER

A. Above and Below Grade

1. All waste, vent, sewer and storm lines shall be of cast iron soil pipe and fittings and shall conform to the requirements of CISPI Standard 301, ASTM A-888 or ASTM A-74 for all pipe and fittings. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International.
    a. Acceptable Manufacturers:
        1. AB&I Foundry
        2. Charlotte Pipe and Foundry
        3. Tyler Pipe Company
    b. Couplings
        1. Standard Couplings: for hubless pipe and fittings shall conform to the manufacturer's installation instructions and local code requirements. Hubless coupling gaskets shall conform to ASTM Standard C-564 and be listed with NSF International.
    c. Mandatory Referenced Standards

1. Cast Iron Soil Pipe Institute Standard Specifications - Latest Issue
   (a) CISPI 301: Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
   (b) CISPI 310: Couplings for use in connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
2. ASTM Standard Specifications - Latest Issue
   (a) A-888: Standard Specifications for Hubless Cast Iron Soil Pipe and Fittings.
   (b) C-564: Standard Specifications for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

2.2 DOMESTIC WATER PIPING

A. Below Grade Water Service outside building
   1. 3" NPS and smaller, Schedule 40 PVC Plastic Pipe and fittings. ASTM D1785, D2466, with Solvent Cement Joints ASTM D2564.
   2. 2" NPS and smaller, Type K Soft Annealed Temper Copper Tube ASTM B88 with Wrought Copper pressure fittings, ANSI B16.22. SIL-FOS - High temperature Brazing Metal Filler.

B. Above Grade (Distribution System inside building)
   1. Piping
      a. For soldered, brazed, and mechanical joints, 4" and smaller Copper Water Tube Type L Annealed Temper (Hard Drawn) ASTM B75 or ASTM B88.
   2. Fittings
      a. Wrought Copper Pressure Solder Fittings, ASME B16.22 or ASME B16-25, 95-5 Tin-Antimony Filler Metal.
      b. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
      c. Copper Unions: MSS SP-123, cast-copper alloy, hexagonal-stock body, with ball-and-socket, met-to-metal seating surfaces, and solder-joint or threaded ends.
      d. Press Fitting: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM. Press fittings shall have an inboard bead design.

1. Copper Press Fittings: Viega/Rigid Tool Company, NIBCO, Elkhart/Apollo Xpress or approved equal.
2. 2"NPS and smaller: Wrought copper fitting with EPDM-rubber O-ring seal in each end.
3. 2-1/2" to 4"NPS: Cast-bronze or wrought copper fitting with EPDM-rubber O-ring seal in each end.

e. Installation- Ready™ fittings for grooved end copper tubing shall be manufactured to copper-tube dimensions, ductile iron conforming to ASTM A-536, Grade 65-45-12, with Installation-Ready™ ends, PVDF (Poly Vinylidene Fluoride) and Grade "EHP" EPDM-HP [Grade 'T' Nitrile] gasket, and ASTM A449 electroplated steel bolts and nuts, rated to 300 psi (2065 kPa) with Type K or L Copper Tubing.

f. All underground water piping within the building boundaries shall be ASTM B88-93a Type "L" annealed (soft) copper tube made up without fittings below the floor level.

2.3 VALVES

A. Acceptable Manufacturers: Victaulic, Milwaukee, Hammond, Jomar, NIBCO, others as noted.

Type	Size Range	Part Number
Ball	2" and smaller (2 or 3 piece)	Milwaukee UPBA400 Hammond UP8301A NIBCO 585-80-LF Victaulic Series P569

Note: Stem extensions of non-thermal-conductive material and protective sleeve that meets UL 2043 approved for inside air plenum and allows operation of value without breaking the vapor seal shall be used on all insulated pipe. NIBCO NIB-Seal handle or acceptable equal.

B. All valves in copper piping shall be soldered in or have screwed threads. Copper-tube dimensioned grooved joints are acceptable for 2-1/2" and larger sizes. Threaded valves shall be installed with sweat to screwed adapters.

C. Valves used on potable water services shall be UL classified in accordance with NSF-61, and meets the low-lead requirements of NSF-372.

2.4 HANGERS AND SUPPORTS

A. In general, all pipe hangers and supports shall conform to the following except where special pipe hangers and supports are detailed on the Drawings. In all cases hanger and support details on the Drawings shall take precedent over the following:

Piping 6" Size and Smaller:

Items	TOLCO	Anvil
Pipe Hanger	1; 2; 200	260
Side Beam Clamp for Wood Joist	58	207
Beam Coupling for Steel Beams	65	92
Rod Coupling for Connection to "Hilti"	70	135
Inserts in Concrete Decks	107; 109A; 109AF	N/A
Trapeze Hangers	Tolstrut A12	AS200
Pipe Clamp	TOLCO cush clamp	AS004OD-AS098OD

B. Similar items by HOLDRITE, Anvil International, Erico-Caddy, or TOLCO/B-Line will be acceptable.

C. Hanger Rods shall conform to the following table:

Tube/Pipe Size	Rod Diameter
1/2" to 4"	3/8"
5" to 8"	1/2"
10" to 12"	5/8"

D. Trapeze hangers may be used where parallel runs of pipe occur. All rods on trapeze hangers shall be 1/2" minimum size.

E. Hanger Support Spacing shall be as follows unless shown otherwise on the Drawings:

1. Horizontal:
    a. Cast Iron: Every other joint unless over 4 feet, then at every joint.
    b. Copper: Every 6 feet for 1-1/2 inch and smaller, and 10 feet for 2 inch and larger.
2. Vertical:
    a. Cast Iron: Base and every floor not to exceed 15 feet.
    b. Copper: Every floor not to exceed 10 feet.

F. Refer to the plumbing code for materials not listed above.

G. At all points where insulated pipe contacts a hanger or support, the point of contact shall be protected by metal insulation pipe shield #B3153 as manufactured by B-Line. Equivalent pipe protectors will be considered provided the substitute item meets the same standard of quality and performance as the specified item.

H. Abrasion-Protection Isolators: Use for prevention of damage to tubes and piping caused by abrasion when passing through or in contact with studs, joists, and similar framing.

1. Products:

a. HOLDRITE #200 Series Isolators and Clamps.

I. Dissimilar Metal Isolators: Use for prevention of damage to tubes and pipes caused by contact between dissimilar metals.

1. Products:

a. HOLDRITE #200 Series Isolators and Clamps.

J. Acoustical Noise & Vibration Isolation System: Consisting of through-stud isolators, pipe clamps, riser clamp pads, neoprene and felt lining material and associated support brackets. For applications requiring acoustical isolation of tubing, piping, and equipment from structure.

1. Products:

a. HOLDRITE Silencer System with HOLDRITE STOUT Bracket System.

K. Seismic restraint devices

1. Available Manufacturers:

a. Anvil/Badger

b. Mason Industries

c. B-Line Tolco Division of Eaton

2. Seismic hanger system design shall meet the requirements of IBC, CBC and ASCE 7-05 and 7-10.

2.5 WALL AND FLOOR PENETRATIONS

A. Fire walls and floors:

1. Wall and floor penetrations shall be protected with a U.L. approved fire rated system. The system shall be per the Drawing Details, or other manufacturer's installation instructions.

2. Fire stopping materials by Hilti, Metacaulk, or 3M are considered equal. The material shall be the same as called out for in the U.L. approved system.

B. Poured concrete walls and floors:

1. Pipes penetrating poured concrete walls and floors shall be protected by providing the following:

a. A Schedule 40 PVC sleeve one (1) size larger than the pipe or one quarter (1/4) inch of foam material wrapped around and secured to the pipe or packed and caulked with mineral wool.

b. Protection shall end flush with the wall or floor surface.

C. All walls and floors:

1. Piping passing through walls and floors exposed to view shall be provided with chrome plated split-ring escutcheon plates in finished areas. Brass or galvanized escutcheon plates may be used elsewhere.

2.6 FLASHING

A. All flashing shall be 4 lb. sheet lead and all vents penetrating the roof shall be flashed and counter-flashed. Stoneman Co. roof flashing assembly with 10" skirt or equal may be used.

B. The flashing for vents penetrating a metal roof shall have a corrosion resistant aluminum base compatible with the roofing system. A rubber type flashing by "Tech Specialties" shall be installed between the flashing and pipe.

2.7 VALVE BOXES

A. Brooks Products Inc., Christy Co., or equal with the word "Water" or "Gas" cast in cover as applicable.

2.8 CLEANOUTS

A. Provide cleanouts per Drawings and details on Drawings. Cleanouts as manufactured by J.R. Smith, Mifab, Sioux Chief, or Zurn are acceptable substitutes provided they are equal if approved by Engineer.

B. Cleanout tops to be installed with tamper-proof screws.

2.9 FLOOR DRAINS, FLOOR SINKS

A. Provide floor drains as specified on the Plumbing Fixture Schedule. Cast iron body floor drains as manufactured by J.R. Smith, Mifab, Sioux Chief, or Zurn are acceptable substitutes provided they are equal if approved by Engineer.

B. Provide floor sinks as specified on the Plumbing Fixture Schedule. Enameled cast iron floor sinks as manufactured by J.R. Smith, Mifab, Sioux Chief, Zurn, or Commercial Enameling are acceptable substitutes provided they are equal if approved by Engineer.

2.10 WATER HAMMER ARRESTORS

A. Provide Wilkins Piston Model #1250XL, Sioux Chief #65X-X, Precision Plumbing Products, or equal, as sized on the Drawings or required by PDI. Install per manufacturer’s instructions.

2.11 AUTOMATIC TRAP PRIMERS

A. Provide Precision Plumbing Products, J.R. Smith, Mifab, Sioux Chief, or Zurn as specified on the Drawings. Install per manufacturer's instructions.

2.12 PLUMBING FIXTURES

A. Fixture locations, quantities, types, sizes and connections shall be as shown on both the Plumbing and Architectural Drawings. If a conflict in fixture location is noted between the Plumbing and Architectural Drawings, the Architectural Drawings shall take precedence.

B. Fixtures shall be thoroughly protected against damage to the chrome plate or enamel, by chipping, scratching or other damage during the entire period of construction. Roof drains, floor sinks and drains, toilet and sink drains, plumbing vents, and all other similar fixtures shall be covered to prevent trash from entering the pipes until final installation of grates, domes, fixtures or other protective devices.

C. Provide fixtures as specified in the Plumbing Fixture Schedule.

D. Stainless Steel lavatories or sinks: Just, Elkay, Advance Tabco, Haws, or Acorn are acceptable substitutes provided they are equal if approved by Engineer.

E. Vitreous China fixtures: American Standard, Kohler, Mansfield, Sloan, Toto, or Zurn are acceptable substitutes provided they are equal if approved by Engineer.

F. Fixture carrier numbers listed are as specified on the Plumbing Schedule; however, carriers as manufactured by J.R. Smith, Mifab, or Zurn are acceptable provided they are equal.

2.13 CONNECTORS

A. Provide Brass Craft "Speedway" or equal heavy pattern iron pipe size brass stops, rigid or flexible supplies and chrome plated brass "P" traps. Stops in "Public" areas are to have screwdriver slots and those in "Private" areas are to have all cross handles.

B. Provide Brass Craft or equal flexible stainless steel braided water supplies to appliances. They may also be used to fixtures as an option to rigid supplies. Aquaflo is an acceptable substitute.

2.14 ACCESS BOXES

A. See section 15100 for access panels.

2.15 BACKFLOW PREVENTORS

A. Provide all potable water outlets with hose attachments with non-removable hose bibb backflow preventers per the C.P.C.

2.16 WATER HEATERS

A. Provide water heaters as specified in Plumbing Schedule or approved equal of size, capacity, recovery, and KW/BTUH input. American, A.O. Smith, Bradford White and State are considered equal. Heater shall be A.G.A. or U.L. listed.

1. Heater storage tank shall be provided with magnesium anodes, approved standard pressure/temperature relief valve and all standard factory trim.
2. Provide approved flexible copper supplies for the water heater water connections.

B. Provide an aluminum Smitty Pan Mfg. Co. overflow pan with 1" drain outlet or equal under water heater as specified on the drawings. Oatey, HOLDRITE, & Benjamin Mfg. Co are considered equal.

2.17 PRESSURE-TEMPERATURE RELIEF VALVE

A. Pressure-temperature relief valve shall be Wilkins TP220, TP3000 series, or equal.

B. Piping from valve to termination shall be Type L Copper, hard drawn with wrought copper pressure fittings and 95-5 tin antimony filler metal.

2.18 EXPANSION TANK

A. Expansion tank shall be Wilkins XT series as specified on the Drawings or approved equal in size and capacity. Amtrol expansion tanks are considered equal. Expansion tanks shall be lead-free for use in domestic water piping system.

2.19 WATER HEATER SEISMIC RESTRAINTS

A. Seismic restraints shall be Watts Spacemaker restraint system Model E-50 or E-100 as applicable for the water heater specified. Spacemaker Model #TSE-25 or Seismik Model #SR-2 may be substituted when first approved by the Engineer. Refer to details on drawings for additional specifications.

2.20 INSULATION

A. All pipe insulation shall conform to Section 120.3 of the California Energy Efficiency Standards except to the extent that this Specification supersedes the minimum standards as established by the Code, in which case this Specification shall take precedent. Outside insulation shall be protected with a hard plastic or metal shell covering.

B. Insulation and lining material shall meet requirements of flame spread not to exceed 25 and smoke developed not to exceed 50 as tested by Procedure ASTM-E-84, NFPA 255 or U.L. 723 and shall conform to NFPA 90A and 90B.

C. Interior primary condensate piping shall be insulated with Armacell AP/Armaflex tube insulation with reinforced lap seal or approved equal.

D. Domestic cold water piping shall be insulated with a minimum 1" insulation in unheated areas of the building and where exposed outside of the building.

E. Domestic hot water piping shall be insulated with Owens-Corning Fiberglass heavy density pipe insulation 25 ASJ/SSL-II (All Service Jacket/Double/ Self-

Sealing Lap). Insulation shall be UL rated non-combustible pipe insulation with a k factor of 0.24-0.28 @ 100 degrees F. mean temperature, an embossed vapor barrier laminated and pressure sealing lap adhesive. All lap and butt strips shall have integral pressure-sensitive strips and shall be applied in strict accordance with manufacturer's instructions.

1. Closed cell polyethylene foam by IMCOA or equal may be used at Contractor's option provided it meets the above requirements.

F. Insulation thickness' shown below are based on insulation having a conductivity range of 0.22 to 0.28 per BTU/inch per hour per square foot per °F temperature of 100 degrees F.

Temperature Range: Above 105°F-140°F

Pipe Size	Minimum Insulation Wall Thickness
1" and less	1.0"
1.25"	1.5"
1.5"	1.5"
2" and more	2.0"

G. Insulation materials not meeting the specified conductivity range shall be submitted for approval and determination of the insulation thickness required.

PART 3 - EXECUTION

3.1 GENERAL CONDITIONS

A. Examine the areas and conditions under which Work of this Section will be performed. Conditions detrimental to timely and proper completion of the Work shall be brought to the attention of the Architect before the installation of materials. Do not proceed until unsatisfactory conditions are corrected. Incorrectly installed materials requiring changes will be at Contractor's expense.

B. All plumbing fixtures, appliances, and appurtenances furnished with manufacturer's installation instructions shall be installed per those instructions.

3.2 PLUMBING SYSTEM LAYOUT

A. Lay out the plumbing system in careful coordination with the Drawings. Determine proper elevations for all components of the system and use only the minimum number of bends to produce a satisfactorily functioning system.

B. Follow the general layout shown on the Drawings in all cases except where other Work may interfere.

C. Lay out pipes to fall within partitions, walls, or roof cavities, and to not require furring other than as shown on the Drawings.

3.3 PIPING INSTALLATION

A. Pipe sizes as shown on drawings are Nominal Pipe Size (NPS) or Iron Pipe Size (IPS). Drawings and fixture schedule indicate pipe sizing per the CPC and Standard Engineering Practice. Pipe sizes shall be maintained to fixtures, appliances and equipment. Approved reducing fittings shall be installed at all points of connections.

B. Install piping generally square with building, free of traps or air pockets, and true to line and grade. Keep all piping tight to the building structure, unless pipe slope is required. Do not install piping in any locations where, in the Architect's opinion, it will interfere with the use of the building or create a safety hazard. Where space is inadequate, notify the Architect in time to avoid unnecessary Work. Install all exposed piping as high as possible without interfering with other trades.

C. Make changes in direction with manufactured fittings; use long radius elbows. Street elbows, bushings, close nipples and bending of pipe or tubing will not be allowed.

D. Provide "P" traps at sanitary sewer drainage devices without integral traps.

E. Underground plastic pipe will horizontally transition to metal pipe 5 feet before the above ground riser. Install plastic pipe with a minimum of 36" of cover when located under areas of possible vehicle traffic. Approved metallic pipe must be used if the minimum depth is not met. A tracer wire, terminating at each end at an exposed location, will be installed with all underground plastic pipe. Gas piping will also have a continuous tape marked "Gas" laid 6" above it.

    1. Piping may terminate a maximum of one foot above ground when encased in a listed metallic transition riser.

F. Use friction wrenches when installing brass, polished, or soft metal piping, and when installing piping exposed in finished areas. Replace piping showing wrench marks.

G. Attach escutcheon plates to pipes with set screws or spring clamps with concealed hinges. Continue insulation through escutcheon plates.

H. General:

    1. Proceed as rapidly as the building construction will permit.

    2. Thoroughly clean items before installation. Cap pipe openings to exclude dirt until fixtures are installed and final connections have been made.

    3. Cut pipe accurately, and work into place without springing or forcing, properly clearing windows, doors, and other openings. Excessive cutting or other weakening of the building will not be permitted.

4. Show no tool marks or threads on exposed plated, polished, or enameled connections from fixtures. Tape all finished surfaces to prevent damage during construction.
5. Provide sufficient swing joints, ball joints, expansion loops, and devices necessary for a flexible piping system, whether or not shown on the Drawings.
6. Support piping independently at pumps, coils, tanks, and similar locations, so that weight of pipe will not be supported by the equipment. Support the equipment independently from the pipe.
7. Pipe the drains from mechanical equipment, drip pans, relief valves, air vents and similar locations, to an open sight drain, floor drain, or other acceptable discharge point, and terminate with an air break or air gap per C.P.C.
8. Securely bolt all equipment, isolators, hangers, and similar items in place.

3.4 HANGER AND PIPE SUPPORT INSTALLATION

A. Support pipes from structure with assemblies specified. Provide auxiliary members, anchors, guides, and sway braces necessary to maintain pipe alignment and prevent excessive movement or strain on piping system or components; allow for expansion and contraction of piping. Provide at least one hanger for each branch. Do not use powder driven fasteners, wire, perforated tape, nails, wood blocking, or other makeshift devices to support pipe.

B. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

C. Isolate piping systems from building structure to minimize noise transfer by using acoustical suspension isolator silencer and bracket system.

D. Protect tubing and piping from damage caused by abrasion when passing through studs, joists, and similar framing using abrasion protection isolators.

E. Penetration Protection: Provide allowance for thermal expansion and contraction of copper tubing passing through a wall, floor, ceiling or partition by wrapping with an approved tape or pipe insulation, or by installing through an appropriately sized sleeve. Penetrations of fire resistance rated assemblies shall maintain the rating of the assembly.

F. Prevent damage to piping and tubing caused by contact between dissimilar metals using insert system designed specifically for this application.

G. Attach supports to structure with bolts, screws or concrete anchors, per support manufacturer’s requirements.

H. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

I. CPVC Piping Systems: Provide necessary allowance in piping systems to handle expansion and contraction. Install ample swings or offsets in branch connections to avoid undue strains on fittings or short pipe supplies. Provide expansion loops and pipe anchors as required and/or indicated on the drawings. Refer to manufacturers' recommendations for proper loop sizing of CPVC piping systems.

3.5 JOINTS AND CONNECTIONS

A. Cut pipe shall be reamed to full inside diameter of pipe. Cut threads straight and true. Insure all filings have been removed from inside of the pipe. Apply liquid Teflon to male pipe threads and not inside fittings. Use graphite on cleanout plug threads.

B. Couplings in cast iron "No-Hub" soil/waste pipe and fittings shall be made up with neoprene gaskets and stainless steel bands conforming to CISPI 310, torque to the manufacturer's specification with an approved torque wrench. Joints in hub and spigot shall be made up with compression gaskets conforming to ASTM C-564.

C. Joints in copper tube shall be made with 95-5 tin-antimony or lead-free solder, applied in strict accordance with the manufacturer's directions.

D. Dissimilar metals shall be isolated with dielectric couplings, "EPCO" or approved equal. Dielectric Waterway Fittings shall be UL classified in accordance with ANSI / NSF-61 for potable water service, Victaulic Style 647. Provide access panels at all hidden couplings.

E. Press Connections: Copper press fittings shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.

3.6 SANITARY SEWER, VENT AND INDIRECT WASTE SYSTEM INSTALLATION

A. Install horizontal drainage piping at a minimum 2%, condensate 1%, slope unless otherwise noted. Where this is impractical notify the Architect before installing the pipes.

B. Install vent piping to drain back into the sewer system.

C. Provide cleanouts where shown on Drawings and where required by governmental agencies having jurisdiction.

1. All cleanouts to grade shall be firmly secured by means of a concrete block 20" square by 5" thick, and shall be flush with finished grade, unless otherwise noted on the plans.

D. Provide automatic trap primers as specified at floor sinks and drains as indicated on Drawings or where required by governmental agencies having jurisdiction. Provide access panels for all hidden mechanical trap primers.

3.7 VALVE INSTALLATION

A. Provide valves in the water system. Locate and arrange to provide complete regulation of apparatus, equipment, and fixtures.

B. Provide valves in at least the following locations:

1. In branches and/or headers of water piping serving a group of fixtures.
2. On both sides of apparatus and equipment.
3. For shutoff of risers and branch mains.
4. For flushing and sterilizing the system.
5. Where shown on the Drawings.

C. Locate valves for easy accessibility and maintenance. Provide access panels for all hidden valves.

D. Unions shall be installed downstream of all screwed valves.

3.8 WATER HAMMER ARRESTOR INSTALLATION

A. Provide water hammer arrestor on hot and cold water lines.

1. Install at all quick closing valves, solenoids, and supply headers at plumbing fixture groups.
2. Locate and size as shown on Drawings, and where not shown, locate in accordance with Plumbing and Drainage Institute Standard WH-201.
3. Install water hammer arrestor behind access panels.

3.9 BACKFLOW PREVENTION INSTALLATION

A. Protect plumbing fixtures, faucets, hose connections, and other equipment having plumbing connection, against possible back-siphonage.

B. Arrange for testing of backflow devices as required by the governmental agencies having jurisdiction.

3.10 PLUMBING FIXTURE INSTALLATION

A. Connect plumbing services to fixtures as shown on Drawings and as specified.

B. Provide & install compression stops and flexible supplies per fixture manufacturer's recommendation or as high as possible on wall directly below fixtures.

C. Install fixtures at right angles to, and tightly against, building surfaces, and in proper alignment. Fill gaps between fixtures and building surfaces with white grout. Mounting heights and locations shall be as shown on the Drawings, or, if not shown, as directed by the Architect.

3.11 INSULATION INSTALLATION

A. Ensure surfaces are clean and dry surfaces to application of insulation or adhesives.

B. Insulate piping, fittings, valves, and strainers. Leave unions exposed. Where insulation terminates, bevel ends of insulation and continue jacket over insulation and secure to pipe. Do not interrupt insulation at hangers, supports, clamps, or penetrations through structure. Fittings shall be finished with "Zeston" or approved equal fitting closures. If fitting closures not available, use 8 oz. canvas dipped in "Seal-Fas".

C. Attach longitudinal jacket laps and butt strips with factory applied pressure sensitive adhesive. On concealed piping only, outward clinching coated staples at two inch spacing may be used. Cover elbows with one piece polyvinyl chloride covers. Secure with tack fasteners. Tape ends of covers with matching tape on exposed piping. Seal off all cut ends with canvas and Benjamin Foster 30-36.

D. Install closed cell polyethylene foam per manufacturer's instructions.

E. Insulate traps and trap arms on floor sinks located above slab receiving discharge from ice machines and soda dispensers with ½" insulation.

F. Insulate primary condensate piping located within return air plenums with ½" wall thickness.

3.12 TESTING AND ADJUSTING

A. Provide personnel and equipment, and arrange for and pay the costs of, all required tests and inspections required by governmental agencies having jurisdiction. See Section 15100 for test requirements.

B. Where tests show materials or workmanship to be deficient, replace or repair as necessary, and repeat the tests until the specified standards are achieved.

C. Adjust the system to optimum standards of operation.

3.13 CLEANING (For potable water systems)

A. Disinfection: The hot and cold water distribution system shall be disinfected prior to being placed in service. The system shall be disinfected within 3 weeks of occupancy in accordance with AWWA C651 or the following requirements:

1. The piping system shall be flushed with potable water until discolored water does not appear at any of the outlets.
2. The system shall be filled with a water chlorine solution containing at least 50 parts per million of chlorine. The system shall be valved off and allowed to stand for 24 hours. Or, the system shall be filled with a water chlorine solution containing at least 200 parts per million of chlorine. The system shall be valved off and allowed to stand for 3 hours.
3. Following the standing time, the system shall be flushed with water until the chlorine is purged from the system.
4. Provide bacteriological sampling and analysis results to the Engineer for review.

3.14 WARRANTY

A. The contractor shall warranty all systems for proper operation installed by the contractor for not less than one calendar year from date of project completion. This completion date shall be set by the Architect or owner.

END OF SECTION 22 0000

SECTION 23 0013

GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Related Documents:

1. The other Contract Documents complement the requirements of this Section.
2. Division 1 - General Requirements applies to the Work of this Section.
3. Where requirements of this Section exceed those in other Contract Documents, Contractor shall comply with the requirements of this Section.

B. Codes and Regulations:

1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.

C. Included: Work includes, but is not limited to the following:

1. Plumbing
2. Carpentry and metal Work required for Work of this Section and not specifically shown under another Section. Openings in concrete or masonry construction shall be either core drilled or saw cut unless indicated otherwise on Drawings.
3. Excavation and Backfill
4. Coordination Drawings

D. Related Work:

1. Painting (Division 09)
2. Cutting and Patching (Division 30)
3. Low voltage electrical control (Division 26)

1.2 DEFINITIONS

A. Furnish: Purchase and deliver to job site in new condition.

B. Install: Receive and store at job site until required; place secure and connect; furnish required appurtenances.

C. Provide: Furnish and install as defined above.

D. Section: Refers to a Section of these Specifications.

E. Standards: The issue in effect as of the date of the contract documents.

1.3 PROJECT RECORD DRAWINGS

A. Comply with pertinent provisions of Architectural Sections (Division 1).

1.4 SERVICE INTERRUPTIONS

A. When Work of this Section requires temporary shutdown of existing systems for connections, the shutdown shall be made only during pre-arranged time agreeable to the Owner.

1.5 CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS

A. The Mechanical Drawings are, in general, made to scale and the Contractor may obtain approximate distances and dimensions by scaling the Plans. It is distinctly understood, however, that it is done entirely at the Contractor's responsibility. Refer to Architect's Plans and Specifications for construction details, which will affect the Work and equipment. Examine the Architectural, Civil, Structural, Mechanical, Electrical, Landscape, Irrigation, Data, Fire Protection and Plumbing Plans and Specifications to ensure that this work does not conflict with the above trades. Plumbing, Mechanical and Electrical Plans are diagrammatic and, therefore, do not necessarily represent the exact installation. However, pipe sizing for utility services and ductwork are calculated per their respective codes and Standard Engineering Practice and shall be installed as sized from point of origin to terminal point. It shall remain the Contractor's responsibility to submit Shop Drawings if he/she has any questions about the final arrangement. Nothing on these Plans or Specifications shall be construed to permit work not conforming to all applicable codes and regulations.

PART 2 - PRODUCTS

2.1 ACCESS PANELS

A. If not called for under other Sections, furnish Milcor, Elmdor, or Jay R. Smith access panels where shown on the Drawings or required for maintenance access to completed Work of this Section. Submit size, type, and location of proposed access panels not specifically shown, for review by Architect.

B. Access panels shall be constructed of 16 gauge prime coated steel or stainless steel with screwdriver operated cam latch, concealed hinges, and fire rating equal to adjacent construction.

C. Provide flush type doors with:

1. Stainless steel finish for tiled surfaces.

2. Prime coated finish for other surfaces.

2.2 FLASHING

A. Provide watertight flashing at all openings through exterior walls and roof. Refer to Architectural Drawings.

2.3 PIPE WRAPPING

A. All pipe, metal components, and joints buried in ground shall be primed and protected with 10-mil tape double wrapped or approved equal per IAPMO IS 13-2006. Before tape application, all bare pipe and fittings to be wrapped must be coated with pipe wrap primer. Stretch first layer of tape to conform to the surface while spirally half-lapping, apply a second layer, half-lapped and spiraled as the first layer with spirals perpendicular to first wrapping. In lieu of tape wrap, heat shrinkable 10-mil minimum thick polyethylene sleeve may be used.

B. When applying tape, use only enough pull to cause the tape to properly conform to the irregular surfaces of the item. The proper amount of pull is reached when the tape surface is smooth without any wrinkles. Continue tape 4" above grade. End overlaps should point down. Tape shall be applied per manufacturer's installation instructions.

2.4 GENERAL EQUIPMENT INSTALLATION REQUIREMENTS

A. Install equipment to provide neat appearance, required manufacturer's access, and required space to allow replacement or maintenance. Provide bases, supports, anchor bolts, and other items required to install equipment. Installation shall be level and braced per CBC.

2.5 COORDINATION OF WORK

A. Coordinate Work of this Section with Work of other Sections to avoid conflicts. If required, provide shop drawings and submit to Architect for approval.

B. Insure that Work of other Sections is suitable to accommodate Work of this Section.

2.6 ADEQUACY OF FURRING

A. Conceal piping and ductwork in spaces provided unless specifically shown otherwise. If spaces are inadequate, notify Architect prior to ordering materials and fabrication of components.

2.7 PROTECTION AND CLEANING

A. Protect equipment from dirt, moisture, and mechanical damage during construction. Restore or replace damaged equipment to original condition.

B. Keep interior of piping free of foreign material during construction. Flush piping systems with test medium specified under Piping Tests before installing equipment and appurtenances or making final connections.

2.8 CLOSING-IN OF UNINSPECTED WORK

A. Do not conceal or cover Work before tests and observations are completed. Uncover Work prematurely closed in and repair resulting damage to all Work, if requested by Architect, Engineer, or Project Inspector.

2.9 DAMAGE

A. Repair or replace items damaged by leaks or overflow from Work provided under this Section and for any damage to any part of the project site, for a period of 1 year after notice of completion date. This is in addition to and not a limitation of other rights the Owner may have against the contractor under the Contract Documents.

2.10 MECHANICAL SYSTEM TESTING

A. Furnish all test pumps, gauges, and equipment. Test all safety controls and devices.

B. For air tests, install a calibrated test pressure gauge in the piping system to observe any loss in pressure. Calibrate the test pressure gauge with a dead weight tester within 15 days before use and certify by initial and date on a sticker applied to the dial face. Maintain the required test pressure for the time indicated. Brush joints with a soapy water solution to check for leaks if the required pressure cannot be maintained.

C. After any test, repair all leaks found as directed and re-test as necessary until the system is proven tight.

D. Before applying test pressure to any piping systems the Contractor shall be responsible for isolating all equipment e.g. control valves, regulators, relief devices, tanks and any other line accessories, which would otherwise be damaged by the test pressure.

1. Soil, Waste, Vent:

a. Entire System: Tightly close all openings except the highest one. Fill to overflowing with water.

b. Sections of System: Tightly close all openings except the highest opening of the section under test. Fill section with water to test each section with a minimum 10-foot head of water except for the uppermost 10 feet of the system.

c. Allow to stand for (4) hours or longer, as required to complete the inspection.

2. Domestic Water: Fill with water and test at 150 psig. Retain for (4) hours.

2.11 CUTTING AND PATCHING

A. The Contractor shall do all cutting and patching which may be required for the installation of the Work under this Division of the Specifications. Patching shall be of the same quality, materials and finish as, and shall match accurately, all surrounding construction. No cutting of the Structure shall be permitted without the approval of the Architect.

B. Wherever concrete or paved surfaces are cut to provide for the installation under this Section, the Contractor shall restore the surfaces to their original condition. Subgrade materials, concrete, and paving materials, along with the placement of same, shall be in accordance with the respective Sections of this Specification as they apply to the installation of such material.

2.12 EXCAVATION AND BACKFILL: (Buried pipes within the building walls and to 5 feet from the building.)

A. Dig trenches straight and true to line and grade; bottom shall be left smoothed of rock points. Pipe shall be supported for the entire length on undisturbed, original earth. The minimum trench width shall be 16" and all pipe shall be 2 feet below the finished grade, minimum, wherever conditions permit. Sewer pipes to be below grade a s necessary to meet the slope and invert on the Drawing. Whenever substantial variations of pipe bury is indicated by field conditions, the proposed changes in depth of bury shall be submitted, in writing, to the Architect for approval.

B. All piping shall be laid on a bed of clean dry sand not less than 6" thick. The space between the pipe and the sides of the trench shall be backfilled with clean dry sand to a point 6" above the crown of the pipe. Both sides of the pipe shall be filled at the same time.

C. Installation of Thermoplastic Pipe and Fittings: Trench width for thermoplastic sewer pipe shall be 1.25 times the outside diameter of the piping plus 12 inches or the outside diameter of the piping plus 16 inches. Thermoplastic piping shall be bedded in not less than 4 inches of granular fill supporting the piping. The backfill for thermoplastic piping shall be compacted along the sides of the piping in 6 inch layers and continue to not less than 12 inches above the piping. Compaction shall be not less than a 85 percent standard proctor density.

D. The remainder of the trench shall be backfilled with native soil in lifts no greater than 12" and shall be mechanically compacted by tamping so to maintain a minimum relative dry density of 95%, determined by California Impact Test Method No. 216.

E. All backfilling shall be brought flush with finished subgrade.

F. Excess material shall be removed from the site. Trenches shall be backfilled immediately after approval.

2.13 INSTALLATION OF PIPING,

A. The installation of piping shall be made in such a manner to clear beams and obstructions. Do not cut into or reduce the size of plates or any load carrying members without approval of the Architect. Check Drawings and Work of others to prevent interference. Deviations of the Work determined by the Architect shall be installed by the Contractor without additional cost.

B. Install piping promptly, cap or plug open ends of pipe. No piping shall be permanently covered by construction before inspection and approval. Piping and ductwork shall be installed in accordance with best practice and recommendations of the manufacturer.

C. Conceal piping unless indicated otherwise. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions. Remove defective material from site. Install piping generally level, free of traps and unnecessary bends to conform with building requirements, and provide space for other work. Piping to be free of unusual noises. Avoid any possible galvanic action by isolating dissimilar metals with suitable Dielectric Insulating Fittings.

D. Unless called for otherwise, hereinafter in this Specification or by specific detail on the Drawings, all water pipes in contact with structure and/or hangers shall be suitably isolated. In the case of uninsulated pipe, "Trisolators" or equal shall be used.

E. Protect enameled or polished equipment from damage, tool marks, etc.

2.14 STERILIZATION OF PIPES

A. After preliminary purging of the Systems, the entire domestic potable water system pertaining to Work under this Contract shall be chlorinated in accordance with American Water Works Association, State of California Health and Safety Code procedure for disinfecting water mains. A thorough flushing operation shall be run upon completion of sterilization. Contractor shall then arrange with local health authority for test on mains and water systems and provide three (3) copies of test results to the Architect.

2.15 SEISMIC BRACING

A. It shall be required that pipes, ducts and conduits be supported and braced per the SMACNA "Seismic Restraints Manual Guidelines for Mechanical Systems", 1998 Edition.

B. When the SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems" does not specifically address the size of duct or pipe to be braced, the following shall apply:

1. All ducts shall be braced and guyed to prevent lateral or horizontal swing to the satisfaction of the Architect, Engineer, and State Inspector.

2. All pipes shall be braced and guyed to prevent lateral or horizontal swing to the satisfaction of the Architect, Engineer, and State Inspector. Absolutely, no "Plumber's Tape" shall be used anywhere on this project.

C. The SMACNA Manual can be obtained through SMACNA online. Contractor shall obtain manual prior to the start of any work.

2.16 OPERATION AND INSTRUCTION

A. The Contractor shall furnish competent Technicians to supervise start-up operations of equipment specified by the Architect or Engineer and to instruct Owner's operators. The Contractor shall furnish six complete sets of operating instructions and service manuals to the Architect.

B. Instruction period shall be started after instruction books and service manuals have been submitted to and approved by the Architect and shall be at hours (regular and non-regular) arranged by the Architect.

C. Service manuals shall include oiling, cleaning, and servicing data, compiled in clearly and easily understood form and in a durable binder. Data shall show all serial numbers of every piece of equipment and complete list of replacement parts.

2.17 WARRANTY

A. The contractor shall warranty all of the systems for proper operation installed by the contractor for not less than one calendar year from date of project completion. This completion date shall be set by the Architect or Owner.

END OF SECTION 22 0013

SECTION 26 0500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
1. Materials and equipment shall be furnished and installed in support of electrical work described in these plans and specifications including but not limited to, raceways, boxes, enclosures, feeders, branch circuiting, supports, terminal cabinets, sleeves, gutters, panels, transformers, switchgear, lighting fixtures, controls, relays, contactors, in order to complete and make fully functional the systems described.
2. Lighting systems, both interior and exterior as shown on the plans and as specified herein, including controls, occupancy sensors, lumen sensors, photocell controls, lamps, dimmers, racks, dimming ballasts, supports, fasteners, straps, and miscellaneous mounting hardware and support structures for such equipment.
3. Electrical, Telephone and CATV Utility company site work as required by the serving companies. All utility company conduits, raceways, trenching, backfilling, utility vaults, equipment pads and substructures shall meet both the respective utility companies requirements as well as those of the authority having jurisdiction, whichever is more restrictive. In no case shall work be completed and covered without the written approval of the serving utility companies both on and off site.
4. Duct banks and raceways for all power and communications systems as shown and/or required. Duct banks shall include all trenching, racking, conduit, concrete, backfill, boxes, pads, substructures required for a fully developed and useable pathway for cables, conductors, as shown on site, etc.
5. HVAC and plumbing electrical: Conduit, conductors and terminations for all line voltage power, line voltage controls and fusible and/or non-fusible safety disconnect switches for HVAC equipment, including but not limited to air conditioners, furnaces, fans, heat pumps, cooling towers, system pumps, condensing units. Provide protective equipment unless otherwise noted, etc. including protective devices.
6. Plumbing Electrical: Conduit, conductors and terminations for plumbing equipment with power requirements including necessary fusible and/or non-fusible safety disconnect devices. Provide motor starters where required unless provided by mechanical specification.
7. Power and Lighting Distribution: Furnish and install power and lighting distribution systems including but not limited to panels, feeders, transformers, branch circuits, devices, fixtures, disconnect switches, contactors, controls, etc. for a complete working system.

8. Fiber infrastructure including all boxes, raceways, cable tray, , dedicated branch circuits, sleeves and penetrations, etc. as described and as shown in plans, risers, specifications, EIA/TIA standards and/or required for a complete and operating system.
9. Lighting acceptance testing, documentation and completion of required forms as specified in Section 26 5670, LIGHTING ACCEPTANCE TESTING.
10. Allocation of time to adequately train the Owner on the use and operation of all systems installed within the facility or on the property. Minimum two week advance notice shall be coordinated with the Owner and his representatives. Training shall be as outlined in individual system specifications identified to follow.

B. Related Sections Under Other Divisions:
1. Mechanical Wiring: Control circuit wiring, energy management controls and interlocks for mechanical equipment shall be installed by Mechanical Contractor.
2. Painting of electrical equipment where exposed and required by the Architect to be painted as described elsewhere in the specification.
3. Irrigation System: Provide all line voltage (50 volts or above) connections to irrigation system equipment, time clocks and or powered satellite controls. Coordinate locations of this work with the Landscape Contractor.
4. Pole Bases: Contractor shall be responsible to furnish light standard concrete pole bases, rebar, bolt templates and anchor bolt kits for a complete installation. Concrete, rebar, excavation shall be by Contractor in accordance with all parts of this specification.
5. HVAC Control Raceway: Raceways, boxes, and control wiring for thermostats, temperature sensors and control components specified within the mechanical specifications, shall be furnished and installed as required by Division 25 and installed in accordance with the minimum wiring methods allowed for branch circuit wiring in Division 26 (the DDC systems/EMS systems and components are installed in accordance with Division 25).

1.3 SYSTEM DESCRIPTION

A. The electrical plans indicate the general layout and arrangement; the architectural drawings and field conditions shall determine exact locations. Field verify all conditions and modify as required to satisfy design requirements as well as code minimums. Maintain all required working clearances as described in CEC Article 110 as well as other applicable articles.

B. Discrepancies shall be brought immediately to the attention of the Architect for clarification. The Architect shall approve any changes. Prior to rough-in, refer to architectural plans that shall take precedence over electrical plans with respect to locations.

C. Verify all power and communications utility company requirements prior to commencement of utility work. Make proper adjustments to the construction to satisfy the serving utility requirements if they differ from the construction documents. It shall be the Contractor's responsibility to contact each utility company for obtaining finalized utility design drawings and/or approval, and for scheduling inspection of utility infrastructure installations.

D. Charges imposed by the electric and communications utility companies shall be paid by Owner directly to utility companies.

1.4 SUBMITTALS AND SHOP DRAWINGS

A. Before construction, submit in accordance with the General Conditions of this Specification: A complete list of all materials proposed to be furnished and installed under this section.

B. Manufacturers' specifications, catalog cuts and shop drawings as required to demonstrate compliance with the specifications. Identify specific intended use for each component where submittal may be ambiguous. Submit entire bound submittal at one time; partial submittals will not be accepted. At a minimum, submittals will be required for the following:
   1. Utility service/site work equipment including ducts, conduits, fittings, concrete manholes, concrete and fiberglass pull, manhole, boxes, vaults, trench racks, accessories, etc.
   2. Distribution equipment including main switchboards, distribution switchgear, transformers, distribution panels and breakers, motor controls, distribution and branch circuit panels, grounding, transient voltage surge suppressors, etc.
   3. Electrical equipment including disconnects, fuses, raceways, straps and racks, fittings, conductors, boxes, gutters, devices, plates, etc.
   4. Lighting equipment including fixtures, ballasts, lamps, mounting accessories, color charts (where required), etc.
   5. Lighting control equipment including low voltage switching system, dimmer switchbank / accessories, occupancy sensing equipment, time clocks, contactors, photocells, lumen sensors, etc.
   6. Constructability review letter/comments for lighting acceptance testing as required by Section 26 5670, LIGHTING ACCEPTANCE TESTING.
   7. Complete system component submittals and shop drawings for:
      a. City Fiber
      b. Communication Data Cabinet
   8. Conduit including all fittings, etc.
   9. Wiring and cable, terminations, etc.
   10. Fire rating penetration materials, details, etc.

C. The intent of these specifications is to establish a standard of quality for materials and equipment. Therefore, some items are identified by manufacturer or trade name designation. Substitutions shall be subject to the Architect's approval. Samples of the proposed and substitute materials may be required for inspection prior to approval. Costs, if any, for evaluation of substitutions shall be the Contractor's responsibility. The decision of the Architect shall be final. Where the substitution will affect other trades, coordinate all changes with those trades concerned and pay any additional costs incurred by them as a result of this substitution. Approval of substitutions shall not relieve the Contractor from providing an operational system in accordance with all applicable codes and ordinances.

D. SUPPORTING DEVICES
   1. Provide all details of suspension and support for ceiling hung equipment.
   2. Where walls, floor, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the submittals must include spacing, static loads and seismic loads at all attachment and support points.
   3. Provide seismic details of seismic restraints and anchors; including number, size and locations for each piece of equipment.

1.5 DELIVERY, STORAGE AND HANDLING

A. Storage of equipment for the job is the responsibility of the Electrical Contractor and shall be scheduled for delivery to the site, as the equipment is required. Damage to the equipment delivered to the site or in transport to the job shall be the responsibility of the Electrical Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall be new and bear the label of or be listed by a nationally recognized testing laboratory. The quality and suitability of all materials shall conform to the standards and practices of this trade.

B. Supplied materials shall be of a current manufactured product line. Discontinued products are not acceptable. Where products are identified on the contract documents by part number, supply the current product model or series which meets the specification and intended use of the specified component.

2.2 SUPPORTING DEVICES

A. Hangers: Kindorf B-905-2A Channel, H-119-D washer, C105 strap, 3/8” rod with ceiling flange.

B. Concrete Inserts: Kindorf D-255, cast in concrete for support fasteners for loads up to 800 lbs.

C. Pipe Straps: Two-hole galvanized or malleable iron.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Professionalism and appearance of installations shall be in accordance with accepted practices of this trade. Installation methods shall conform to manufacturers' specifications and recommendations. The Contractor shall man the job with qualified journeymen and helpers in this trade for the duration of the job. It is the Contractor's responsibility to communicate with and keep the job superintendent appraised of changes or clarifications, etc.

B. Employment of any person on any job in the capacity of an electrician is not permitted unless such person has qualified for and holds a valid Journeyman Electrician Pocket Card or General Journeyman Electrician Certificate issued by the State of California Division of Apprenticeship Standards except, Contractor may employ electrical helpers or apprentices on any job of electrical construction, new or existing, when the work of such helpers or apprentices is performed under the direct and constant personal supervision of a journeyman electrician

holding a valid Pocket Card accepted by the State of California Division of Apprenticeship Standards.

1. Each Pocket Card carrying journeyman electrician will be permitted to be responsible for the quality of workmanship for a maximum of one helper or apprentice during any same time period, provided the nature of work is such that good supervision can be maintained and the quality of workmanship is the best, as expected by Owner and implied by the latest edition of the National Electrical Code.
2. Before each journeyman electrician commences work, deliver to Owner at the project site, a photocopy of the journeyman's valid Pocket Card.

C. Materials shall be installed in accordance with the manufacturers' specification and recommendations. They must conform to the approval AHJ adopted codes and standards, but not less than the 2013 CEC and all applicable codes and standards, including but not necessarily limited to California Code of Regulations Title 24, NFPA, National Electrical Manufacturers Association, ANSI, CBC, and any other adopted ordinances of applicable agencies having jurisdiction. Refer to general conditions of specifications.

D. Electrical Contractor shall lay work out in advance in order to avoid unnecessary cutting, chasing, and drilling of floors, walls, ceilings and other surfaces. Work of this nature shall be carefully done so as not to damage work already performed by other trades. Any damage which results must be properly repaired at no extra cost to the Owner. Such alterations shall not depreciate the integrity of the structure. Approval for cuts or penetrations in structural members shall be by the Architect.

E. Supporting Devices:
1. Verify mounting height of all luminaires or items prior to installation when heights are not detailed.
2. Install vertical support members for equipment and luminaires, straight and parallel to building walls. Provide independent supports to structural member for electrical luminaires, materials, or equipment installed in or on ceiling, walls or in void spaces or over furred or suspended ceilings.
3. Do not use other trade's fastening devices as supporting means for electrical equipment, materials or luminaires. Do not use supports or fastening devices to support other than one particular item.
4. Support conduits within 18" of outlets, boxes, panels, cabinets and deflections. Maximum distance between supports not to exceed 8' spacing.
5. Securely suspend all junction boxes, pull boxes or other conduit terminating housings located above suspended ceiling from the floor above or roof structure to prevent sagging and swaying.
6. Provide seismic bracing per UBC requirements for this building location.

F. Coordinate work with other trades as required to eliminate any delays during construction. Coordinate changes with other prime contractors to avoid construction conflicts.

G. Engineer's Field Observation: Site visits during construction for field observations and reports will be conducted by electrical engineer when directed by the Architect. A list of items that need to be addressed will be submitted to the Architect for forwarding to the Contractor. A written response to all items shall be submitted for Owner's review once complete. When Electrical Engineering representative performs a field observation, the Electrical Contractor shall be present and available to remove equipment covers as needed.

H. Drawings of Record: Provide a full and accurate set of field record drawings marked up in a neat and understandable manner submitted to the Owner Representative, Construction Manager, or Architect upon completion of the work and prior to issuance of a certificate of completion. The drawings shall dimension all electrical facilities including but not limited to underground conduit, vaults, boxes as well as conduit routing scaled to within 12" of actual field conditions and shall be kept up to date on a daily basis reflecting changes or deviations. Electrical facilities shall be accurately drawn on the plan to scale. Refer to the general conditions of these specifications for additional requirements. Record drawings shall be required to identify both horizontal and vertical dimensions to visible and fixed points such as concrete, asphalt, buildings, sidewalks, etc.

I. Identification: Provide engraved laminated plastic nameplates for all switchboards, panelboards, fire alarm terminal cabinets, telephone and cable television backboards, main devices, control panels, time clocks, contactors and safety disconnect switches accurately identifying each device. Labels shall be attached to the equipment by means of screws or rivets. Self-adhering labels will not be acceptable. Refer to Section 26 0553, IDENTIFICATION OF ELECTRICAL SYSTEMS.

J. Safety: The Electrical Contractor is responsible to maintain equipment in a safe and responsible manner. Keep dead front equipment in place while equipment is energized. Conduct construction operations in a safe manner for employees as well as other work persons or anyone visiting the job site. Provide barriers, trench plates, flags, tape, etc. The Contractor shall hold all parties harmless of negligent safety practices that may cause injury to others on or near the job site.

K. Guarantees: Equipment and labor shall be guaranteed and warranted free of defects, unless otherwise stated to be more restrictive, for a period of one year from the date of final acceptance by the Owner. A written warranty shall be presented to the Architect at the time of completion prior to final acceptance. Equipment deemed to be damaged, broken or failed should be repaired or replaced at no additional cost to the Owner. Materials or system requiring longer than a one-year warranty as described herein shall be separately warranted in separate letters of guarantee stating the duration of warranty.

L. Operating and Installation Manuals: Provide two copies each of manuals, operating and installation instructions for equipment indicated in submittal packages. Instruct the Owner's representative as to the operation and location of equipment necessary to allow them to operate the facility upon final acceptance. This instruction period shall be prearranged with the Owner's representative prior to occupancy of the facility and the weeks prior to training scheduled.

M. Lighting Acceptance Testing: Provide two copies of lighting acceptance testing results and equipment operating manuals as specified in Section 26 5670, LIGHTING ACCEPTANCE TESTING. Instruct the Owner on operation of control systems.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 0519

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Wires and cables.
2. Connectors.
3. Lugs and pads.
4. MC cable (not allowed)

1.3 SYSTEM DESCRIPTION

A. Provide wires, cables, connectors, lugs, strain reliefs, racking insulators for a complete and operational electrical system.

1.4 SUBMITTALS

A. Provide product data for the following equipment:
1. Wires.
2. Cables.
3. Connectors.
4. Lugs.
5. Splice Kits.
6. Strain Relief Fittings.
7. Cable Racking and Insulators.

B. Provide the insulation cable testing report in the project closeout documentation, refer to Closeout Requirements in the General Conditions portion of this specification.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of the CEC, latest adopted version with amendments by local Authority Having Jurisdiction (AHJ).

B. Furnish products listed by UL or other testing firm acceptable to AHJ.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wires and Cables: General Cable, Okonite, Southwire, or approved equal.

B. Connectors: Burndy, Ilsco, Thomas & Betts, or approved equal.

C. Wire connectors shall be minimum 75 degree centigrade rated and properly sized for the number of conductors being connected, terminated, spliced etc. All above grade connectors shall be solderless lug or plastic wire nut type, screw on, pressure cable type (wire nut or spring nut type), 600 volt, 105 degree C, with skirt to cover all portions of stripped wires. Connector shall be U.L. rated for number and size of conductors being joined together as a splice.

D. Splices:
1. Branch Circuit Splices: Ideal, Scotch-Lock, 3M, or approved.
2. Feeder Splices: Compression barrel splice with two layers Scotch 23 and four layers of Scotch 33+ as vapor barrier.
3. Screw Terminal Lugs.
4. Kearney Split Bolt.

E. MC Cable: Alflex, AFC, or approved and shall meet all CEC Article 334 provisions.

2.2 WIRES AND CABLES FOR LINE VOLTAGE SYSTEM AND CONTROLS. WIRE AND CABLE SHALL BE:

A. Copper, 600 volt rated throughout. Conductors 14AWG to 10AWG, solid or stranded. Conductors 8AWG and larger, stranded.

B. Phase color to be consistent at all feeder terminations; A-B, top to bottom, left to right, front to back. Phasing tape shall be permitted on sizes #6 and larger.

C. Color Code Conductors as Follows:

PHASE	240 VOLT
A	Black
B.	Red
Neutral	White
Ground	Green

D. All conductors shall be copper unless otherwise noted. Minimum size for individual conductors shall be #12 AWG unless otherwise noted. Sizes #8 AWG and larger shall be stranded conductor. Individual conductors shall be insulated with type, XHHW, THW, THHN/THWN 600-volt insulation unless otherwise noted. Control, signal, communication conductors shall be as dictated by the vendor of that equipment or as specified here-in. Proper insulation type shall be used for the proper environmental application (i.e., waterproof, wet location, plenum, temperature rated). If a condition exists where the application is uncertain, contact the Engineer for direction. Contractor is responsible to follow specific cabling requirements described in other sections of this specification relative to various communications and controls systems as

well as the respective riser diagrams shown on plans. If a discrepancy occurs, communicate such discrepancy to the Architect and Engineer immediately for resolution.

E. Insulation types THWN, THHN or XHHW. Minimum insulation rating of 90C for branch circuits.

F. Refer to signal and communications specification sections for cable requirements.

2.3 CONNECTORS

A. Copper Pads: Drilled and tapped for multiple conductor terminals.

B. Lugs: Indent/compression type for use with stranded branch circuit or control conductors.

C. Solid Conductor Branch Circuits: Spring connectors, wire nuts, for conductors 18 through 8AWG.

2.4 LUGS AND PADS

A. Ampacity: Cross-sectional area of pad for multiple conductor terminations to match ampere rating of panelboard bus or equipment line terminals.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation: Conductors shall not be installed until after conduit systems are permanently in place. Use an approved non hardening type wire pulling lubricant if lubricant is to be used. Maintain all conduits and wire pulls free from foreign material. If due to field conditions, more than a total of 300 degrees of bend are required; a pull box shall be furnished and installed for ease of installation. Said pull boxes must be sized and rated for the appropriate application and must remain easily accessible upon completion of the project (approval of the location shall be obtained from the Architect prior to installation). Show these pullboxes on the field record drawings. Conductors installed in underground raceways on site shall be duct sealed and taped where they exit the raceway to prevent the entrance of foreign material and moisture after the conductors are installed. Proper drainage shall be provided for underground pull and splice boxes.

B. Insulation: Use proper insulation types where temperature and environment are a factor.

C. Splices at or below grade level shall be made with wet location rated and approved mechanical connectors and shall be encapsulated in epoxy or plastic molded poured kits. The connections must be assured to be watertight. Splices at or below grade shall always be avoided and minimized. Prior approval is required for feeder splices below grade. Submit proposed materials and exhibit showing location of intended splices for Engineer's review and approval prior to commencing with the work.

D. Labeling: All conductors in panels, switchboards, terminal cabinets, vaults, pull boxes, and junction boxes shall be labeled with tape number markers indicating circuit number and identifying system. All labeling shall be permanent. In manholes and vaults, provide embossed brass tags identifying system serviced and function. See Section 26 0553 IDENTIFICATION OF ELECTRICAL SYSTEMS.

E. All conductors, wiring, cable where installed below floor, slab or underground shall be considered wet locations, and shall be rated accordingly. Non waterproof cabling is not allowed in any below grade or wet application.

F. Cables routed together in cable tray shall be stacked, organized and tie wrapped together in a neat and workman like manner. Random cable routing is not acceptable.

G. Cable and conductors routed through pull boxes and vaults shall be properly supported on porcelain or equal insulators mounted on steel rack inserts. Bend radius of cable or conductor shall not be less than six times the overall cable diameter.

H. Wires and Cables:
   1. Conductor Installation:
      a. Install conductors in raceways having adequate, code size cross-sectional area for wires indicated.
      b. Install conductors with care to avoid damage to insulation.
      c. Do not apply greater tension on conductors than recommended by manufacturer during installation.
      d. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation.
   2. Conductor Size and Quantity:
      a. Install no conductors smaller than 12AWG unless otherwise shown.
      b. Provide all required conductors for a fully operable system.
   3. Provide dedicated neutrals (one neutral conductor for each phase conductor) in the following single phase circuits:
      a. Dimmer controlled circuits.
      b. 120v circuit
      c. Ground fault and arc fault protected circuits where a GFI and arc fault breakers are used in panelboards.
   4. Conductors in Cabinets:
      a. Cable and train all wires in panels and cabinets for power and control neatly and uniformly. Use plastic ties in panels and cabinets.
      b. Tie and bundle feeder conductors in wireways of panelboards.
      c. Hold conductors away from sharp metal edges.
      d. Connectors: Retighten mechanical type lugs and connectors for conductors to equipment prior to Notice of Completion.

3.2 FIELD QUALITY CONTROL

A. Tests:
   1. Test conductor insulation on feeders of 400 amp and greater for conformity with 1000 volt megohmmeter. Use Insulated Cable Engineers Association testing procedures. Minimum insulation resistance acceptable is 1 megohm for systems 600 volts and below.

2. Test Report: Prepare a typed tabular report indicating the testing instrument, the feeder tested, amperage rating of the feeder, insulation type, voltage, the approximate length of the feeder, conduit type, and the measured resistance of the megohmmeter test. Submit report with operating and maintenance manual.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Grounding and bonding requirements of electrical installations for personnel safety and to provide a low impedance path for possible ground fault currents as described in CEC Article 250.
   2. "Grounding electrode system" refers to all electrodes required by CEC, as well as including made, supplementary, lightning protection system and telecommunications system grounding electrodes.
   3. The terms "connect" and "bond" are used interchangeably in this specification and have the same meaning.

B. Related Work:
   1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be permitted to be identified per CEC.

B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes No. 10 AWG and smaller shall be ASTM B1 solid bare copper wire.

C. Conductor sizes shall not be less than what is shown on the drawings and not less than required by the CEC, whichever is greater.

2.2 GROUND RODS

A. Copperclad steel, 5/8" diameter by 8’ long, conforming to UL 467 unless otherwise noted on drawings and details.

B. Quantity of rods shall be as required to obtain the specified ground resistance or additional rods shall be driven to obtain specified resistance or less.

2.3 SPLICES AND TERMINATION COMPONENTS

A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

PART 3 - EXECUTION

3.1 GENERAL

A. Ground in accordance with the CEC, as shown on drawings, and as hereinafter specified.

B. System Grounding:
1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.

C. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, fire sprinklers, plumbing piping, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.3 SECONDARY EQUIPMENT AND CIRCUITS

A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.

B. Metallic Piping, Building Steel, and Supplemental Electrode(s):
1. Provide a grounding electrode conductor sized per CEC between the service equipment ground bus and all metallic water and gas pipe systems, building steel, and supplemental or made electrodes. Jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
2. Provide a supplemental ground electrode and bond to the grounding electrode system.

C. Service Disconnect: Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.

D. Switchgear, Switchboards, Unit Substations, and Motor Control Centers:
1. Connect the various feeder equipment grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
3. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground bus.

E. Transformers:
1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to nearest component of the grounding electrode system and the ground bar at the service equipment.

F. Conduit Systems:
1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor sized per CEC.
2. Non metallic conduit systems shall contain an equipment grounding conductor, except that non-metallic feeder conduits which carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment need not contain an equipment grounding conductor.
3. Metal conduit containing only a grounding conductor, and which is provided for mechanical protection of the conductor, shall be bonded to that conductor at the entrance and exit from the conduit.

G. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, power and lighting branch circuits.

H. Boxes, Cabinets, Enclosures, and Panelboards:
1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes.
2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.

I. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.

J. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.

K. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures

connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

L. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

M. Raised Floors: Provide bonding of all raised floor components.

N. Panelboard Bonding: The equipment grounding terminal buses of the normal and emergency branch circuit panelboards shall be bonded together with an insulated continuous copper conductor not less than No. 8 AWG where panels are in same room together or within 25' of each other. These conductors shall be installed in rigid metal conduit.

3.4 CONDUCTIVE PIPING

A. Bond all conductive piping systems, interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

3.5 TELECOMMUNICATIONS SYSTEM

A. Bond telecommunications system grounding equipment to the electrical grounding electrode system. Refer to City of SLO Cabling Standards

3.6 GROUND RESISTANCE

A. Grounding system resistance to ground shall not exceed 25 ohms. Make necessary modifications or additions to the grounding electrode system for compliance without additional cost to the Owner. Final tests shall assure that this requirement is met and test results shall be submitted to the Owner with final close out documents.

B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE Standard 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

C. Services at Pacific Gas and Electric Company interface point shall comply with their ground resistance requirements.

D. Below-grade connections shall be visually inspected by the IOR prior to backfilling. The Contractor shall notify the IOR 24 hours before the connections are ready for inspection.

E. Furnish a copy of tests to Owner at completion of project.

3.7 GROUND ROD INSTALLATION

A. Drive each rod vertically in the earth, not less than 7 1/2’ in depth.

B. Where permanently concealed ground connections are required, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.

C. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 0533

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Conduit and fittings.
2. Outlet boxes.
3. Weatherproof outlet boxes.
4. Junction and pull boxes.
5. Cabinets, termination cabinets.
6. Gutters.
7. Concrete boxes and vaults.
8. Fiberglass or composite boxes and vaults.
9. Hazardous Location: Sealing Fitting

B. Related Work:
1. Installation of all wire, cable, conductor, boxes/gutters, pull ropes, fiber optic cable raceway, conduit, innerduct, cable sleeve and duct as described on the plans and/or as specified here-in. This scope shall include pathways to be installed underground on site and offsite, underslab, above grade, both concealed and exposed, overhead concealed and exposed as appropriately applied. Raceways/boxes shall be installed in accordance with their intended and allowed uses and as specified here-in whichever is more restrictive. Size and capacity of all raceway/boxes shall be as specified here-in or as depicted on the drawings, but shall not be less than that required by code. Larger raceway sizes may be specified than code would permit. The specifications shall govern.
2. Listed products for termination, coupling, extending, benching supports of raceways shall be used.
3. Raceways/boxes described by this section shall include, but not be limited to, power for site utilities and lighting, site and building communications, controls, fire alarm, security, access control, sound systems, data system, energy management systems, power distribution, lighting, lighting controls, video, CATV, voice communications, intercom, nurse call, HVAC and other building low voltage/communications systems controls as may be required. Raceways, boxes and duct paths required for utility companies shall be installed per plans unless utility company requirements are more restrictive at which time those requirements shall take precedence.
4. Protection of and cleanliness of pathways and raceways must be assured during the construction process in order to eliminate the possibility of debris entering the conduit,

duct, pathway resulting in decreased wire capacity and potential damage to installed conductors and cables.

5. Pathways are shown in a diagrammatic way and are generally accurate as to routing, however, it is the Contractor's responsibility as a means and methods process to coordinate with all other trades that require space within a building. The Contractor shall obtain approval for installation of raceways routing through structural footings, retaining walls, columns, beams, perlins, grade beams, etc.
6. It is the Contractor's responsibility to insure that all raceway and boxes systems penetrate fire assemblies and sound rated assemblies in an approved manner using the appropriate and listed products for the purpose.
7. Trenching and backfilling for all underground conduit systems installed by the Electrical Contractor shall be the responsibility of the Contractor. Conduits shall have minimum cover requirement of 36" below finish grade with the exception of site lighting conduits which may be 24" below finish grade minimum. More stringent depth requirements may be imposed by the local agency and utility company and shall be adhered to, and / or this specification or as detailed on the plans. Joint trenching may be utilized where practicable and where permitted by this specification. Concrete, native material and sand shall be used as backfill material and shall be compacted in accordance with and coordinated with the grading and site preparation requirements. Conduits shall rest in a minimum of 4" bed of sand prior to backfill and compaction. Locations of existing underground (UG) utility systems shall be determined by calling Underground Service Alert (USA) at least 48 hours prior to any excavation. Also refer to Section 26 0546.13, ELECTRIC UTILITY SYSTEMS.
8. Minimum conduit size shall be 1/2" except if plan shows or code requires larger size. Exception: Use minimum 3/4" for underslab and below grade applications outside of building exterior walls.
9. All electrical, control, communications systems shall be installed in metallic conduit system. This shall include but not be limited to all systems described in Section B.3 above, except for voice and data systems which shall be installed as described on these plans and as specified here-in but shall not be less than the recommendations of EIA/TIA standards.
10. All line voltage wiring within the building shall be installed in metallic conduit.
11. All conduit, concrete pads, underground concrete or fiberglass substructures shall be furnished and installed with the approved materials and type for the application. Provide proper traffic control during construction as well as barriers and protection of all excavations and trenching.
12. Empty or future conduits shall be properly plugged with plastic caps or inserts with a 3/8" polyethylene pull rope. Plastic or "duct" tape will not be acceptable.
13. Exterior installations: After conductors are installed, seal conduit ends to prevent entrance of foreign material using pliable duct seal, caps or waterproof expanding foam.
14. All low voltage systems including intercom, fire alarm, public address, etc. shall be in dedicated conduit systems and as recommended by EIA/TIA standards. It shall be the contractor's responsibility to provide raceway down walls to outlet boxes and to provide sleeves across inaccessible ceiling spaces.
15. Underground conduits entering building shall have the open end of conduit within building above the elevation of the conduit outside the building such that water cannot enter building through conduit. If such a condition exists, a pull box outside of building footprint shall be installed in conduit route before conduit enters building whereby top of pull box is below finish floor of building and moisture may exit box before entering building.

16. No single conduit run of any type shall exceed 300 degrees of radius bend from termination box to termination box.
17. Separate Raceway System: Provide a separate dedicated raceway system for each system installed, do not combine different systems into a raceway or cable tray system, unless otherwise noted or allowed.
18. Spare, Future Conduits: Conduits labeled conduit only, spare, or for future use, shall be provided with a pullrope, capped at each end, labeled as spare with destination marked, and turned over to the Owner in an unused state. Contractor shall not utilize these conduits for the installation of cabling or conductors as part of this scope of work. Contractor to verify and install at no additional cost to the Owner, additional conduits as required for the installation of the systems being installed.
19. Outlet System: Provide electrical boxes and fittings as required for a complete installation. Including but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts, covers and all other necessary components.
20. Code Compliance: Comply with CEC as applicable to construction and installation of electrical boxes and fittings and size boxes according to CEC 312, 314 and 366 except as noted otherwise.
21. Outlets to be flush mounted: Maintain integrity of insulation and vapor barrier. Unless otherwise noted, flush mount all outlet boxes.
22. Provide putty pads of proper type around outlet boxes and/or as detailed on plan to meet sound transmission restrictions and fire ratings of walls.

1.3 SUBMITTALS

A. Provide Shop Drawings and Product Data for the Following Equipment:
1. Conduit and fittings.
2. Outlet boxes.
3. Weatherproof outlet boxes.
4. Junction and pull boxes.
5. Cabinets, termination cabinets.
6. Gutters.
7. Concrete boxes and vaults.
8. Paver vaults boxes and vaults
9. Putty pads.
10. Raceways

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.

B. Furnish products listed by UL or other independent and nationally recognized testing firm.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Heavy wall Rigid Non-Metallic Conduit, shall be PVC schedule 40 manufactured in accordance with NEMA Standard TC-2, UL-651 and WC 1094A specifications.

B. Extra heavy wall non-metallic conduit, shall be PVC schedule 80 manufactured in accordance with NEMA Standard TC-2, UL-651 and WC 1094A specifications.

C. Galvanized Rigid Steel (GRS) conduit shall be hot dipped galvanized, zinc coated and shall comply with Underwriters Laboratories UL-6, ANSI Specification C-80.1 and Federal Specification WW-C-581E.

D. Electrical Metallic Tubing (EMT) shall be zinc coated, with a protective coating applied to the inside surface and shall comply with Underwriter Laboratories UL-797 ANSI Specification C-80.3 and Federal Specification WW-C-563A.

E. Flexible Metal Conduit (FMC) shall be continuous wound reduced wall galvanized steel produced to UL standards.

F. Liquid tight flexible metal conduit shall have a thermoplastic cover over a galvanized steel core containing an integral copper ground in sizes to 1 1/4" and shall be in compliance with UL standards and CEC Article 350.

G. Manufacturers:
1. Outlet Boxes: Bowers, Raco, Steel City or equal.
2. Weatherproof Outlet Boxes: Bell, Red Dot, [Carlon] or equal.
3. Floor Boxes: Wiremold/Walker, Hubbell, Steel City, or equal.
4. Junction and Pull Boxes: Circle AW, Hoffman, Wireguard or equal.
5. Box Extension Adapter: Bell, Red Dot, [Carlon] or equal.
6. Conduit Fittings: O-Z Gedney, Thomas & Betts, or equal.
7. Vaults: Christy, Brooks, Utility Vault or equal.
8. Putty pads: 3M, Hilti, or equal.
9. Heavy wall rigid non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
10. Extra heavy wall non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
11. Galvanized Rigid Steel (GRS) conduit shall be hot dipped galvanized, zinc coated and shall comply with Underwriters Laboratories UL-6, ANSI Specification C-80.1 and Federal Specification WW-C-581E.
12. Electrical Metallic Tubing (EMT) shall be zinc coated, with a protective coating applied to the inside surface and shall comply with Underwriter Laboratories UL-797 ANSI Specification C-80.3 and Federal Specification WW-C-563A.
13. Flexible Metal Conduit (FMC), Alflex, American Flexible Conduit or equal.
14. Liquid tight flexible metal conduit, Anacanda (type UA), Electri-flex Liquatite or equal.
15. Surface mount raceway, Wiremold, Three Compartment Series 5500 or equal
16. Masonry Boxes, outlets in concrete, Raco Series 690 or equal.
17. Exterior In-Grade Boxes for Non-Utility Company, Precast concrete or polymer concrete, Utility Vault and Christy.

2.2 OUTLET BOXES

A. NEMA 1 gutter, junction and pull boxes shall be fabricated from code gage steel finished in grey enamel with screw cover fronts and concentric knockouts in all sides.

B. NEMA 3R gutter, junction and pull boxes shall be fabricated from code gage galvanized steel with screw cover fronts and concentric knockouts in the bottom only. Any penetrations to the side, top or back shall be weatherproofed in an approved manner such as “MYERS” gasketed type hub or equal.

C. Steel outlet boxes and plaster rings shall be galvanized rigid assemblies, either one piece pressed or factory welded construction containing the size and number of knockouts required. Steel outlet boxes shall be manufactured, sized and installed in accordance with CEC Article 314. Device Outlet: Installation of one or two devices at common location, minimum 4” square, minimum 1 1/2" deep. Single or 2 gang flush device plaster ring. Raco Series 681 and 686 or equal.

D. Luminaire Outlet: minimum 4” square with correct plaster ring depth, minimum 1 1/2” deep with 3/8” luminaire stud if required. Provide proper depth plaster ring on bracket outlets and on ceiling outlets.

E. Multiple Devices: Three or more devices at common location. Install 1 piece gang boxes with 1 piece device plastering. Install one device per gang unless otherwise allowed.

F. Construction: Provide galvanized steel interior outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. Boxes shall be properly secured to the structure such that they are flush with the finish surface. Boxes shall be made structurally secure by means of the proper fastening devices.

G. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, plaster rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

2.3 WEATHERPROOF OUTLET BOXES

A. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner. Weatherproof boxes in wet locations as described in CEC 406.8 (B) shall be provided with a “while-in-use” cover; red dot ‘CK’ Series of aluminum die-cast construction, NEMA 3R, with lacquer finish.

2.4 JUNCTION AND PULL BOXES

A. Construction: Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers.

B. Location:
   1. Install junction boxes above accessible ceilings for drops into walls for receptacle outlets from overhead.
   2. Install junction boxes and pull boxes as required to facilitate the installation of conductors and limiting the accumulated angular sum of bends between boxes, cabinets and appliances to 300 degrees.
   3. Locations: Junction boxes shall be located only where necessary and only in equipment rooms, closets, and accessible attic and underfloor spaces. A horizontal distance of 24" shall separate outlet boxes on opposite sides of occupancy separation walls, fire-rated walls or partitions.
   4. Labeling: Junction box covers shall be marked with indelible ink indicated the circuit numbers passing through the box.

2.5 BOX EXTENSION ADAPTER

A. Construction: Diecast aluminum.

B. Location: Install over flush wall outlet boxes to permit flexible raceway extension from flush outlet to fixed or movable equipment.

2.6 CONDUIT FITTINGS

A. Requirements: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation.

B. Steel boxes may allow for field knock-out modifications, but shall in all other ways conform to code requirements.

2.7 EXTERIOR IN-GRADE BOXES FOR NON-UTILITY COMPANY USE SHALL BE:

A. Precast concrete or polymer concrete type with full bottoms and draining into gravel drywell. . Open bottom splice/pull boxes 24" x 36" and smaller shall be open bottom, with minimum 12" of gravel below for drainage.

B. Flushmount in hardscape and 1" above grade in softscape.

C. Provided with correct traffic type lid, i.e., full vehicular, intermediate incidental vehicular or pedestrian-rated as applicable stamped with "ELECTRIC", "LIGHTING", COMMUNICATIONS", etc. cover identification as shown on the drawings or as applicable. All boxes or vaults located in streets, driveways, sidewalks wider than 8', and turf areas where mowing takes place shall be traffic rated.

D. Provided with brass hold-down bolts in cover.

E. Provided with necessary box extensions to gain proper depth.

F. Seal all conduits in underground boxes with duct seal after conductors have been installed.

2.8 IN-GRADE UTILITY COMPANY BOXES AND VAULTS

A. In-grade boxes and pads for utility company, shall be as specified by the respective utility company with all of the company's requirements and construction methods met.

2.9 PUTTY PADS

A. Intumescent moldable firestop putty designed to protect electrical outlet boxes.

B. Designed to install around outside of outlet boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Conduit systems listed below are for use in installations where they are permitted to be used by CEC and/or other occupancy restrictions. The below installation methods do not intend to suggest that these materials be installed in conflict with any applicable code. Special attention to applications shall be made in building types such as Educational, Health Care, wet location, hazardous locations, assembly occupancy and multi-story, but not limited to these. Requirements which are more restrictive than the CEC may be called for by the drawings and / or these specifications. These requirements must be adhered to. The Electrical Contractor shall be responsible to use the proper conduit system for the application. Exposed conduit is not allowed below ceilings or above slab of floor, without the permission and approval of the Architect. All conduits shall be concealed except in electrical and telecommunication rooms or where shown to be surface mounted. Exposed conduit (where allowed) shall be run square and plumb with building lines in an approved manner. Support roofmount conduits, where allowed, with minimum 12" wide blocks set in mastic unless otherwise detailed in roof requirements or as specified in roofing specification, by the Architect. Strap conduits to blocks with proper sized conduit straps. Spacing of support shall be a minimum as provided for in the CEC. All exposed conduit mounted below 8' above finished grade shall be strapped at a minimum of 5' spacing.

B. Non-Metallic Rigid Conduit shall be used in concrete slabs, below concrete slabs on grade, or underground outside of a building slab or foundation. Maintain minimum depth requirements and cover with appropriate fill material. Minimum 4" of bedding and cover of backfill material 1/4" size grain and smaller maximum. Conduit shall be heavy wall Schedule 40 or 80, rigid PVC only. Rigid utility P&C duct shall not be used in any application. Properly sized grounding conductors shall be installed per CEC article 250, in all non-metallic conduit branch circuit and feeder runs. PVC conduit shall be formed or field bent only with the use of properly approved bending tools such as to not decrease the internal bore of the conduit. All conduits shall be cut square and reamed of burrs. Approved and compatible glue shall be used on all PVC fittings to attain watertight joints. All non-metallic conduit runs over 150' in length and over 1 1/4" trade size conduit shall utilize galvanized rigid steel elbows.

C. Galvanized Rigid Steel (GRS) conduit shall be used where exposed less than 8'–0" above finished grade to 18" below finished grade and where subject to physical damage. Conduits shall be cut square and reamed to remove burrs and sharp edges. Strap conduit below 8' above

grade at 5' intervals. Unless otherwise noted, threadless setscrew and threadless weathertight fittings may be used in lieu of threaded fittings. All threaded ends entering a junction box of any type shall require one locknut on the inside and one on the outside of the enclosure and be provided with a plastic bushing or grounding bushing where necessary for proper grounding. Where exposed to moisture, a watertight hub or other approved method shall be required. All conduits shall be stubbed up straight and uniform into junction boxes, panels, cabinets, etc., and shall be (GRS) properly supported and strapped. All GRS conduit located below grade, shall be tape wrapped.

D. Electrical Metallic Tubing (EMT) shall be used as allowed by code and as permitted by this specification. It shall not be in contact with soil or the concrete slab on the ground floor of any structure. Connectors and couplings shall be steel insulated set screw type where installed in indoor dry locations not subject to moisture. Where the potential for moisture is present, compression type weathertight fittings are required. One hole conduit straps are permitted from 1/2" to 1" and two hole conduit straps are required for size 1 1/4" and larger. EMT shall not be allowed in areas subject to severe physical damage. Install copper ground wire sized per CEC 250-122 in all EMT conduits.

E. Flexible conduit may be used where concealed in building construction or above dropped ceilings, but shall meet the following criteria: No individual circuit path from distribution panel to last device shall exceed a cumulative length of 30' of flexible conduit from start to end. Flexible conduit shall not exceed a total directional change of 270 bending degrees in any one run between conduit terminations. Squeeze type or Jake type steel flex fittings of a grounding type are required. Flexible conduit must be supported in accordance with CEC. Where exposed to the weather, moisture, or spray down flexible conduit shall be of the liquidtight type. Fittings shall be manufactured for use with liquidtight flexible conduit. All motor connections shall be made with liquidtight flex. Flexible conduit may not be used where exposed except for last 2' of equipment connection and unless otherwise noted or approved. A copper ground wire sized per CEC 250-122 shall be installed in all flexible conduit runs. Flexible conduit may not be used exposed. Weatherproof liquid tight conduit shall not be used at roof level for equipment connections with lengths exceeding 24" nor shall it be used to circumvent a rigid conduit system in a horizontal direction. Connect recessed lighting fixtures to conduit runs with a maximum of 6' of flexible metal conduit extending from junction box to fixture. "Master" "Slave" fixtures are permitted to use manufactured flexible cable of longer dimension up to 12' between "Master" and "Slave" only and only as a U.L. listed system component.

F. Underground conduits and transition to above grade/slab shall be as follows:
1. PVC elbows allowed if top of elbow is minimum 18" BFG or below top of slab, otherwise GRS elbows are required.
2. GRS elbows are required if conduit run is 150' or greater.
3. GRS risers are required from elbow below grade to equipment (device, outlet, panel, cabinet, etc.) above grade.
4. GRS elbows/risers to be PVC coated or 10 MIL taped wrapped (1/2" lapped) to 3" above finish grade or top of slab.

G. Conduit Supports: Conduit runs may be supported by one-hole and two-hole straps or supports as manufactured by Unistrut, Minerallac, Caddy or equals. Supports may be fastened by means of anchors, shields, beam clamps, toggle bolts, or other approved methods appropriate for the application and size of conduit. Pipe nailers (J-hooks) may only be used for 1" conduit and smaller and only in wood frame construction. Conduit support methods are subject to review by

the engineer and authority having jurisdiction for adequacy. Installations deemed inadequate shall be corrected by the contractor at no cost to the Owner.

H. Bends and offsets shall be made with approved tools for the type of conduit being utilized. Bends shall be made without kinking or destroying the smooth bore of the conduit. Parallel conduits shall be run straight and true with bends uniform and symmetrical. Minimum radii shall be per CEC 344-24.

I. Conduit Stub-outs below grade shall be capped with plastic cap, and identified by placing a pull box marked with correctly identified utility such as “Elec”, “Tel”, etc. Dimension for exact location on field record drawings. Provide lids for proper field application (i.e. traffic, incidental, pedestrian).

J. Conduit Seals: Where below grade conduits enter structure through slab or retaining wall of building or basement, seal the inside of each conduit as follows:
1. Provide damming material around conductors 3” into conduit.
2. Fill 3” of conduit with 3M #2123 sealing compound.
3. Wrap conductors where they exit the conduit with 3M #2229 "Scotch Seal" mastic tape. Lap tape to approximate diameter of the raceway and wrap outside of conduit opening with (minimum) one turn.
4. Use conduit sealing bushings type CSB (O-Z/Gedney) or equal.
5. Empty conduits shall be sealed with standard non-hardening duct seal compound and then capped to prevent entrance of moisture and gases and to meet fire resistance requirements.
6. Provide cable drip loop minimum 12” high.

K. Marker tape: Place plastic yellow marker tape at 12” below finish grade along and above buried conduits. Label tape "CAUTION: ELECTRICAL LINES BELOW" or similar wording.

L. Electrical and communications systems raceways routed underground shall not occupy the same trench as plumbing utilities such as sewer, water, storm drain, gas or other wet or dry gaseous utility system. A minimum of 12” of undisturbed earth is required. Where utilities must cross in closer proximity to each other due to physical constraints, 6” minimum crossing distances are allowed, however 18” on all sides of a utility crossing must be concrete encased.

M. Conduits, routed below footings, slabs, grade beams, columns, and other structural elements shall be installed in strict compliance with structural details and criteria shown on structural plans. Clearances below structural elements and sleeves through structural elements must be carefully planned to avoid conflict and must be approved by the structural engineer if conflict arises.

N. All conduit or raceways passing through fire rated walls, floors, or ceilings shall be installed with a listed penetration method which protects the opening to the same rating as the assembly and is non hardening.

O. Expansion Joints
1. Conduits 3” and larger, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install the couplings in accordance with the manufacturer’s recommendations.
2. Provide conduits smaller than 3” with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 5”

vertical drop midway between the end. All conduit shall have a copper green grounding bonding conductor installed.

P. Seismic Joints
1. At seismic joints, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes or approved fittings, on both sides of the joint. Connect conduits to junction boxes with sufficient slack flexible conduit such that these slack conduits are 1 1/2 times the distance between conduit ends. Flexible conduit shall have a copper green ground bonding jumper installed.

Q. Location: Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.

R. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.

S. Special Application: Provide weatherproof outlets for locations exposed to weather or moisture.

T. Knockout Closures: Provide knockout closures to cap unused knockout holes where blanks have been removed.

U. Mount outlet boxes, unless otherwise required by ADA, or noted on drawings, the following distances above the finished floor:
1. Receptacles, Telephone, TV & Data outlets. (measured to bottom of outlet box): +15".
2. Outlet above counter (measured to top of outlet box): +46".
3. Control (light) Switches. (measured to top of outlet box): +48".
4. Fire Alarm Manual Pull Stations, T-stats. (measured to top of outlet box): +48".
5. Fire Alarm Visuals: the lower of +80" to bottom of lens, or 6" below ceiling.
6. Other Outlets: As indicated in other sections of specifications or as detailed on drawings.

V. Coordinate all electrical device locations with the architectural floor plan and interior and exterior elevations to prevent mounting devices within elements that they may conflict such as cabinetry, mirrors, planters, etc.

W. Size outlet and junction boxes to minimum wire fill space requirements. Upsize box as required to allow ease of wire installation and device installation.

X. Outlet and junction boxes in fire rated walls shall be gauged and spaced so as not to exceed the maximum penetration allowed by the assembly without compromising the fire rating. If a conflict arises relative to a specific condition, the contractor shall follow the requirements of the fire authority and ask for guidance from the design team. At no time should a larger box be installed prior to resolution of conflict.

END OF SECTION

SECTION 26 0534

CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Cabinets where shown on the contract drawings and specified herein.

B. Related Work:
   1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 0553, IDENTIFICATION OF ELECTRICAL SYSTEMS.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Type: Cabinets shall be flush or surface mounted type as indicated on the contract drawing, as per Code and U.L. Standard 50.

B. Cabinet Construction: Sizes as indicated, constructed of code gauge sheet steel with hinged lockable doors, common keyed with panelboards. Equip cabinets with 3/4" fire retardant treated plywood backboards and/or barriers as applicable, terminal blocks for connection; index card holders and cards mounted behind heavy plastic on inside of cabinet doors.

C. Finish: Cabinets shall be chemically cleaned and the fronts shall be finished in same way as panelboards and switchboards.

D. Controls: As indicated on the contract drawings.

E. Identification: Provide on exterior of cabinet doors engraved plastic nameplate identifying the cabinet as designated on the Contract Drawing. Lettering shall be white on black finish and shall be minimum 3/16” high. Affix nameplates to cabinet doors with a minimum of two escutcheon pins or screws.

PART 3 - EXECUTION

3.1 GENERAL

A. Required: To be located where indicated on the Contract Drawing and installed as per manufacturer's instruction. Securely fasten to structural members or Unistrut support in vertical and plumb position and at heights indicated.

B. Nameplates: Conform to provisions noted in 2.1E above or as designated on the plans.

END OF SECTION

SECTION 26 0546.13

ELECTRIC UTILITY SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
1. Manholes, handholes and ducts to form a complete underground raceway system.
2. "Duct" and "conduit", and "raceway" are used interchangeably in this specification and have the same meaning. Refer to Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS for approved raceway and materials as well as execution.
3. Scope of Work: Furnishing, installation and connection of manholes, handholes and ducts to form a complete underground raceway system for distribution of electrical and signal systems and utility service entrance facilities. This specification shall also provide guidance for construction of the utility company underground and substructure requirements. Contact serving company directly and obtain current detailed requirements of installation and adhere by same. Provide trenching, conduit, backfill, boxes and equipment pads as applicable. Nothing here in shall be construed to be in conflict with the requirements of the utility company, which shall take precedence over any possible conflicting requirement.

B. Related Work:
1. SITEWORK.
2. FLATWORK.
3. LANDSCAPING.
4. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
5. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings and boxes for raceway systems.
6. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
7. Section 31 2200, GRADING

1.3 SUBMITTALS

A. Submit in accordance with Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manholes, handholes, duct materials, and hardware. Proposed deviations from details on the drawings shall be clearly marked on the submittals.
3. If necessary to locate manholes or handholes at locations other than shown on the drawings, show the proposed locations accurately on scaled site drawings.
4. Precast manholes and handholes: Submit detail drawings and design calculations for approval prior to installation.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. Underwriters Laboratories, Inc. (UL):
1. UL 467 Grounding and Bonding Equipment
2. UL 651 Schedule 40 and 80 Rigid PVC Conduit
3. UL 6 Electrical Rigid Metal Conduit-Steel

C. National Fire Protection Association (NFPA):
1. 70 California Electrical Code (CEC)

D. National Electrical Manufacturers Association (NEMA):
1. RN 1 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
2. TC 2 Electrical Polyvinyl Chloride (PVC) Tubing And Conduit
3. TC 3 PVC Fittings For Use With Rigid PVC Conduit And Tubing

E. American Concrete Institute (ACI):
1. 318 Building Code Requirements For Structural Concrete

F. American Society for Testing and Materials (ASTM):
1. C478 Standard Specification for Precast Reinforced Concrete Manhole Sections
2. C478M Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric).
3. F512-95 Standard Specification for Smooth-Wall Polyvinyl Chloride (PVC) Conduit and Fittings for Underground Installation

G. Utility company Handout Package and Construction Requirements for Underground and Substructure Installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete: ACI 318, 3000 psi minimum 28 day compressive strength.

B. Reinforcing Steel: Number 4 minimum.

C. Manhole Hardware:
1. Frames and covers (traffic type).
2. Sump frames and gratings.
3. Pulling Irons: 7/8” diameter hot dipped galvanized steel bar with exposed triangular shaped opening.
4. Cable supports:
   a. Cable stanchions, hot rolled, heavy duty, hot dipped galvanized "T" section steel 2 1/4" by 1/4" in size and punched with 14 holes on 1 1/2" centers for attaching cable arms.
   b. Cable arms, 3/16” gage, hot rolled, hot dipped galvanized sheet steel pressed to channel shape. Arms shall be approximately 2 1/2" wide and 14” long.
   c. Insulators for cable supports, high glazed, wet process porcelain.
   d. Spares: Equip each cable stanchion with two spare cable arms and six spare insulators for future use.
   e. Miscellaneous hardware, hot dipped galvanized steel.

D. Handhole Hardware:
1. Frames and covers configuration as shown on the drawings.
2. Pulling irons, 7/8” diameter galvanized steel bar with exposed triangular shaped opening.

E. Cable supports are not required.

F. Ground Rod Sleeve: Provide a 3” PVC sleeve in manhole floors so that a driven ground rod may be installed.

G. Manholes and Handholes shall be precast units and be constructed as described below. Units shall comply with ASTM C478, C478M.
1. Size: Plan area and clear height shall be not less than that shown on the drawings.
2. Accessories, hardware, and facilities shall be the same as required for poured in place type.
3. Assume ground water level 3’ below ground surface unless a higher water table is shown in the boring logs and adjust design accordingly.

H. Ducts:
1. Size shall be as shown on drawings.
2. Ducts (concrete encased):
   a. Plastic Conduit:
      1) NEMA TC6 & 8 and TC9 plastic utilities conduit UL 651 and 651A Schedule 40 PVC.
      2) Duct shall be suitable for use with 90 degree C rated conductors.
3. Ducts (direct burial):
   a. Plastic duct:
      1) NEMA TC2 and TC3, EPC-40, Type II.
      2) UL 651 and 651A, Schedule 40 Schedule 80 PVC.
      3) Duct shall be suitable for use with 75 degree C rated conductors.
   b. Rigid metal conduit, PVC-coated: UL6 and NEMA RN1 galvanized rigid steel, threaded type, coated with PVC sheath bonded to the galvanized exterior surface, nominal 0.040” thick.

I. Ground Rods: Per Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

J. Ground Wire: Stranded bare copper No. 6 AWG minimum.

K. Conduit Spacers: Prefabricated plastic.

L. Warning Tape: Standard 4 mil polyethylene 3" wide tape, detectable type, red with black letters, imprinted with "CAUTION BURIED ELECTRIC CABLE BELOW".

M. Pull Rope: Plastic with 200 pound minimum tensile strength.

PART 3 - EXECUTION

3.1 TRENCHING

A. Refer to EARTHWORK section of specification for trenching back-filling, and compaction requirements.

B. Work with extreme care near existing ducts, conduits, cables, and other utilities to avoid damaging them.

C. Cut the trenches neatly and uniformly for utility company trenches, notify for inspections by utility company a minimum of 48 hours in advance.

D. Conduits to be installed under existing paved areas, roads, and railroad tracks which are not to be disturbed shall be protected into place. Conduits shall be minimum 36" cover.

E. Trench Preparation: A 4" sand bedding is required if trench bottom is not rock free. A 4" sand covering over the cable is required if the native backfill is not rock free. Backfill and compaction should meet City, County, State and utility company requirements. The serving utility company may required 100% sand backfill. All backfill requirements shall also meet or exceed those set forth in the earthwork or civil section of this specification.

F. Excavation: Provide 6" gravel in bottom of excavated holes for subsurface transformers and all concrete boxes. Spare gravel shall be available for final adjustment. The Contractor is responsible for final grade level of enclosures and boxes. Non-conformance will be corrected by electrical contractor at his expense.

G. Conduit Routing: Sharp turns, bends, or other irregularities in the conduit must be avoided. Minimum radius bends shall be as required by the serving utility company. Every effort should be made to obtain a straight water tight conduit line. The end of all spare conduits must be capped. The utility company Inspector must approve deviation from layout.

H. Conformance: All work must conform to the utility company "handout package" and Specification 59 and/or 99. Copies are available from the utility company upon request.

I. Joint Trenching: Maintain all required depths, clearance and separations as required by code, ordinance or utility company policies. Coordinate with other utilities to confirm requirements.

3.2 OTHER PADMOUNTED EQUIPMENT

A. Provide adequately sized and reinforced concrete pads with openings for conduit(s) as necessary by the utility company and or the equipment manufacturer.

B. A grounding system shall be installed at each padmounted piece of equipment including, but not limited to, a ground rod, grounding conductor, ufer, and ground grid (if called for).

C. Padmounted equipment shall be bolted to concrete pad with minimum 5/8” x 7 1/2" anchor bolts, one in each of 4 corners of each section of padmounted equipment.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 0553

IDENTIFICATION OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Nameplates and warning signs where specified herein and as shown on contract documents including the following:
      a. Nameplates and warning signs permanently installed on all electrical equipment and devices including, but not limited to, the following items:
         1) Enclosures for transformers, switchboards, motor control, panels, pullboxes, cabinets, motors, generators, transfer switches.
         2) Enclosures for all separately enclosed devices including, but not limited to, disconnect switches, circuit breakers, contactors, time switches, control stations and relays, fire alarm panels and lighting control panel.
         3) Wall switches not within sight of outlet controlled.
         4) Special systems such as, but not limited to, telephone, fire alarm, warning and signal systems. Identification shall be at each equipment rack, terminal cabinet, control panel, annunciator and pullbox.
         5) Devices mounted within and part of equipment including circuit breakers, switches, control devices, control transformers, relays, indication devices and instruments.
   2. Conductor and Cable Identification.

B. Related Work:
   1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
   3. Section 26 2416, PANELBOARDS.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABEL DESIGNATIONS

A. Equipment labels indicating equipment designations both emergency and normal. Designation data per drawings or to be supplied with shop drawings approval.

B. Panelboard labels showing panel designation, voltage, phase and source.

C. In accordance with CEC 110.16, provide arc flash protection warning labels on all switchboards, panelboards, distribution panels, transformers, safety switches, transfer equipment, etc. Labels shall be per ANSI Z535.4 guidelines.

2.2 MATERIALS

A. For Labels: Three layer laminated plastic or micarta with engraved white letters over black background.

B. For Warning Signs: Minimum 18 gauge steel with red lettering on white porcelain enamel finish.

C. Arc flash labels shall be provided as required by CEC Article 70E.

D. Conductor tape number markers: TayMac MX4280 Series non-fading permanent adhesive.

PART 3 - EXECUTION

3.1 MOUNTING

A. Equipment labels shall be mounted by self-tapping, threaded screws and bolts, or by rivets. Adhesive types are not acceptable unless specifically noted in this section.

B. Conductor tape markers shall be consistently placed for ready conductor identification.

3.2 HEIGHTS ON LABELS

A. Panelboards, Switchboards and Motor Control Centers and Special Systems Enclosures: 1/4" identify equipment designation; 1/8” identify voltage rating and source.

B. Individual Circuit Breakers, Switches, and Motor Starters in Panelboards, Switchboards, and Motor Control Centers: 3/16” identify circuit and load served, including location of equipment.

C. Enclosed Circuit Breakers, Enclosed Switches, and Motor Starters: 3/16” identify load served.

D. Transformers: 3/16” identify equipment designation; 1/8” identify primary and secondary voltages, primary source and secondary load. Include location of primary source or secondary load if remote from transformer.

3.3 WARNING SIGNS

A. Warning signs shall be permanently mounted with cadmium plated steel screws or nickel-plated brass bolts.

B. Warning signs to read "DANGER - HIGH VOLTAGE", with letters 1 1/2" high, 3/16” stroke minimum.

C. Provide warning sign on all doors or immediately next to door for equipment rooms, enclosures or closets containing equipment energized above 150 volts to ground as per CEC, and/or as directed by the Architect. For interior finish spaces and interior doors, signage shall be coordinated and approved with the Architect in advance of installation.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 0900

CONTROLS AND INSTRUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Control devices, shown on the drawings and/or required by other sections, to assure a complete and operating system.
   2. Furnish submittals/shop drawings for all equipment in this section as described in Section 26 0500, 1.4, COMMON WORK RESULTS FOR ELECTRICAL.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Terminal and Control Cabinets shall be manufactured from code gauge galvanized steel with hinged locking covers finished in grey or hammer tone enamel. Knockouts, barriers and plywood backing shall be provided where required. Cabinets shall be of raintight construction where exposed to the weather. Approved manufacturers are Circle AW, Wireguard, Benner-Nawman, or equal.

B. Photocontrols and time switches shall be provided as indicated on the drawings. Approved manufacturers are Intermatic, Paragon, Tork or equal. Where indicated on the fixture schedule, photocells in outdoor fixtures shall be factory installed and wired.

C. Lighting Contactors shall be of the correct number of poles with suitable contact ampere ratings. Provide fusing protection for all lighting contactor control circuits. Verify all coil voltages prior to installation. Approved manufacturers are General Electric, Westinghouse, Square "D" or equal.

D. Motor Controls shall be manual or magnetic with motor overload thermal relays. Individual thermal elements sized to the correct motor full load amps shall be used. Provide correct NEMA rated enclosure. Select proper voltage, class, size and horsepower rating. Select the correct coil voltage if magnetic.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Power to all irrigation controllers shall be provided by the Electrical Contractor as required for the irrigation equipment. Also provide and install conduit sweeps as required to house low voltage wiring between controller and exterior below grade.

B. General Purpose Control Contactors shall be rated for the use with the correct ampere rating, voltage, size and horse power rating. Select the correct control coil voltage.

END OF SECTION

SECTION 26 2416

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Panelboards.

B. Related Work:
   1. Division 09 "PAINTING": Identification and painting of panelboards.
   2. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
   3. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
   4. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
   5. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. Underwriters Laboratories, Inc. (UL):
   1. No. 50-1995 Enclosures for Electrical Equipment
   2. No. 67-1993 Panelboards
   3. No. 489-1991 Molded Case Circuit Breakers and Circuit Breaker enclosures

C. National Fire Protection Association (NFPA):
   1. No. 70-2010 California Electrical Code (CEC)

D. National Electrical Manufacturers Association (NEMA):
   1. No. PB-1-2002 Panelboards.
   2. No. AB-3-1996 Molded Case Circuit Breakers and Their Application.

PART 2 - PRODUCTS

2.1 PANELBOARDS

A. Panelboards shall be in accordance with UL, NEMA, NEC, CEC and as shown on the drawings. Approved manufacturers are Cutler Hammer, Square D, Seimens, General Electric.

B. Panelboards shall be standard manufactured products. All components of the panelboards shall be the product and assembly of the same manufacturer. All similar units of all panelboards to be of the same manufacturer.

C. All panelboards shall be dead front safety type. Arrange sections for easy removal without disturbing other sections.

D. All panelboards shall be completely factory assembled with molded case circuit breakers. All factory wiring shall be checked for correct tightness and visually inspected to insure that bussing and terminations have not become loose in transit to job site.

E. Panelboards shall have main breaker or main lugs, bus size, voltage, phase, top or bottom feed, and flush or surface mounting as scheduled on the drawings. Refer to single line diagram and panel schedules on drawings. Terminals shall be minimum 75 degree rated. Back fed main circuit breakers are not allowed. Main circuit breakers shall be vertically mounted.

F. Panelboards shall have the following features:
1. Nonreduced size copper bus bars, and connection straps bolted together and rigidly supported on molded insulators. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of branch circuit devices.
2. Full size neutral bar, mounted on insulated supports.
3. Ground bar and isolation ground bar (where called for in panel schedule) with sufficient terminals for all grounding wires. Buses braced for the available short circuit current.
4. All breakers and phase bus connections shall be arranged so that it will be possible to substitute a 2-pole breaker for two single pole breakers, and a 3-pole breaker for three single pole breakers, when trip is 30 amps or less and frame size is 100 amperes or less, without having to drill and tap the main bus bars at bus straps. Where used for heating and air conditioning, and refrigeration equipment, use only HACR type U.L. listed circuit breakers.
5. Design interior so that protective devices can be replaced without removing adjacent units, main bus connectors, and without drilling or tapping.
6. Where designated on panel schedule as "space", include all necessary bussing, device support and connections. Provide blank cover for each space.
7. In two section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side with cable connections to the second section. Panelboard sections with tapped bus or crossover bus are not acceptable.
8. Series rated panelboards are not permitted.
9. Label all panels in accordance with Section 26 0553, IDENTIFICATION OF ELECTRICAL SYSTEMS.
10. Recessed panel space conduit: Provide (1) ¾ inch spare conduit stubbed to accessible ceiling space and/or interstitial space below floor for every (5) spaces and spares indicated on panel schedules.

G. Panelboards serving as building mains shall be “service entrance rated” and UL Listed as “service equipment”.

2.2 CABINETS AND TRIMS

A. Cabinets:
1. Provide galvanized steel cabinets to house panelboards. Cabinets for outdoor panels shall be factory primed and suitably treated with a corrosion-resisting paint finish meeting UL standard for outdoor applications.
2. All ventilated openings in panelboards and switchboards, shall be furnished with dust filters to prevent entrance of dust and debris.
3. Cabinets for panelboards may be of one piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide necessary hardware for "in" and "out" adjustment of panel interior.
5. Cabinets for two section panelboards shall be arranged side by side, and shall be the same height. Flush mounted cabinets should be 1 1/2" apart and coupled by conduit nipple if necessary.
6. Gutter size in panel boxes, on all sides, shall be in accordance with the CEC. Penetrations through gutter to live area of the panelboard shall incorporate approved non-metallic-grommet type of insulation to protect wire passing through.

B. Trims:
1. Fabricate trim of sheet steel consisting of frame with door attached by concealed hinges. Provide flush or surface trim as shown on the drawings.
2. Flush trims shall overlap the box by at least 3/4" all around.
3. Surface trim shall have the same width and height as the box.
4. Flush or surface trims shall not have ventilating openings.
5. Secure trims to back boxes by indicating trim clamps.
6. Provide a welded angle on rear of trim to support and align trim to cabinet.
7. Provide separate trims for each section of multiple section panelboards. Trims and doors of sections shall be of the same height.

C. Doors:
1. Provide doors with flush type latch and manufacturer's standard lock. Doors over 48 inches in height shall have a vault handle and a three-point catch, arranged to fasten door at top, bottom, and center.
2. In making switching devices accessible, doors shall not uncover any live parts.
3. Provide concealed hinges welded to the doors and trims.
4. For lighting or power contactors incorporated in panelboards, provide separate doors for the contactors.
5. Provide keyed alike system for all panelboards.
6. Provide a directory card, metal holder, and transparent cover. Permanently mount holders on inside of doors.

D. Painting:
1. Thoroughly clean and paint trims and doors at the factory with primer and manufacturer's standard finish.

E. Breaker features shall be as follows:
1. Integral housing of molded insulating material.

2. Silver alloy contacts.
3. Arc quenchers and phase barriers for each pole.
4. Quick-make, quick-break, operating mechanisms.
5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
6. Electrically and mechanically trip free.
7. An operating handle which indicates ON, TRIPPED, and OFF positions.
    a. Line connections shall be bolted.
    b. Interrupting rating shall not be less than the maximum short circuit current available at the line terminals as indicated on the drawings, and as shown on the electrical system protective device study as required in Section 26 0573 OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY. The interrupting rating shall not be less than the minimum identified requirement.
8. An overload on one pole of a multipole breaker shall automatically cause all the poles of the breaker to open.

2.3 INSTALLATION

A. Installation shall be in accordance with CEC, as shown on the drawings, and as specified.

B. Locate panelboards so that the present and future conduits can be conveniently connected. Coordinate the sizes and layout of cabinets within the designated spaces. All equipment must be dimensioned in order to physically fit in the spaces provided and to comply with all code required clearances.

C. Install a typewritten schedule of circuits in each panelboard. Include the room numbers (as finally described by the Owner) and items served on the cards. Obtain final room numbers from Architect prior to creating schedule.

D. Mount the panelboard so that maximum height of the top circuit breaker above finished floor shall not exceed 78 inches.

E. For panelboards located in areas accessible to the public, paint the exposed surfaces of the trims, doors, and boxes with finishes to match surrounding surfaces after the panelboards have been installed.

F. Circuit numbers shall correspond to the approved panel schedule. Provide as-built drawings showing the actual circuit numbers being used for each device on each branch circuit if changes are required.

G. Verify depth of all flushmounted enclosures in walls to be certain wall depth will accommodate panel depth prior to installation.

H. All openings in switchgear and panelboards that are unused shall be sealed with bolts and washers. Use caulking where holes or openings cannot be sealed by way of a washer, or bolts or conduit seals.

I. Contractor shall include the services of an independent testing company to test GFI circuit breakers in distribution and main panelboards.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 26 2726

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. Wiring devices.

B. Related Work:
   1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.
   3. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
   4. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

PART 2 - PRODUCTS

2.1 RECEPTACLES

A. General: All receptacles shall be listed by Underwriters Laboratories, Inc.
   1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature (this feature does not substitute for a grounding conductor terminated on grounding strap of device). Terminal screws shall be brass, brass plated or a copper alloy metal.
   2. Receptacles shall be of a screw terminal type, “pressure type quick wire” terminations are not allowed.

B. Duplex receptacles shall be Style Line/Decora single phase, 20 ampere, 120 volts, 2-pole, 3-wire, and conform to the NEMA 5-20R configuration in NEMA WD 6. The duplex type shall have bussing break-off feature for two-circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal.
   1. Bodies shall be white in color. Verify wiring device color selection to be provided by Architect. Contractor to verify device color with Architect prior to procurement.
   2. Switched duplex receptacles shall be wired so that only the top receptacle is switched. The remaining receptacle shall be unswitched.
   3. Ground Fault Interrupter Duplex Receptacles: Shall be an integral unit suitable for mounting in a standard outlet box.

a. Ground fault interrupter shall be commercial grade and consist of a differential current transformer, solid state sensing circuitry and a circuit interrupter switch. It shall be rated for operation on a 60 Hz, 120 volt, 20-ampere branch circuit. Device shall meet CEC requirements. Device shall have a minimum nominal tripping time of 1/30th of a second. Devices shall meet UL 943.

C. Receptacles; 20, 30 and 50 ampere, 250 volts: Shall be complete and match with appropriate cord grip plug. Devices shall meet UL 231.

D. Weatherproof Receptacles: Shall consist of a listed weather resistant duplex receptacle, mounted in box with a gasketed, while in use weatherproof, cast metal cover plate and cap receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged flap. Approved manufacturers: Intermatic WP10 Series, Thomas & Betts/Red Dot 2CK Series, or engineer approved equal.

2.2 SWITCHES AND DIMMERS

A. Style Line/Decora rocker switches shall be totally enclosed tumbler type with bodies of phenolic compound. Toggle handles color to match receptacle device color unless otherwise specified.
1. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plasters ears and be of a screw terminal type.
2. Shall be color coded for current rating, listed by Underwriters Laboratories, Inc., and meet the requirements of NEMA WD 1, Heavy-Duty and UL 20.
3. Ratings:
   a. 120 volt circuits: 20 amperes at 120-277 volts AC.
   b. 277 volt circuits: 20 amperes at 277 volts AC.
4. The switches shall be mounted on the strike plate side of doors.
5. Incorporate barriers between switches with multi-gang outlet boxes where required by the CEC.
6. All toggle switches shall be of the same manufacturer.

2.3 WALL PLATES

A. Wall plates for switches and receptacles shall be thermo plastic

B. Standard NEMA design, so that products of different manufacturers will be interchangeable. Dimensions for openings in wall plates shall be accordance with NEMA WD1.

C. For receptacles or switches ganged together, wall plates shall be a single ganged plate.

D. Wall plates for data, telephone or other communication outlets shall be as specified in the associated specification.

E. Surface mounted boxes, NEMA1, shall be industrial grade raised galvanized steel covers. In shop areas all receptacles shall be dust proof and or waterproof where applicable.

F. Waterproof device covers shall be cast iron, 4-corner screw type, for FS and FD type mounting. Device covers shall be zinc galvanized finish. Weatherproof covers shall be lockable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Switches installed in hazardous areas shall be explosion proof type in accordance with the CEC and as shown on the drawings.

B. Installation shall be in accordance with the CEC, NECA "Standard of Installation", and as shown as on the drawings.

C. Ground terminal of each receptacle shall be bonded to the outlet box with an approved green bonding jumper, and also be connected to the green equipment grounding conductor.

D. General: Devices shall be of the type specified herein. All devices shall be installed with "pigtailed" leads from the outlet box. No device shall be used in the "feed through" application. Screw terminals shall be used to connect all devices to the circuit and shall be grounded by means of a ground wire where grounding terminals are provided in the device.

E. Installation: Devices and plates shall be installed in a "plumb" condition and must be flush with the finish surface of the wall where boxes are recessed.

F. Mounting heights: All control and convenience devices shall comply with California Code of Regulations Title 24 and ADA with respect to accessibility requirements. Mounting heights indicated on plans shall have precedence.

G. Install switches with the off position down.

H. Clean debris from outlet boxes.

I. Provide extension rings as required to bring outlet boxes flush with finished surface or casework.

J. Test each receptacle device for proper polarity.

END OF SECTION

SECTION 26 5100

INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
1. Interior lighting systems, including luminaires, ballasts, lamps and emergency lighting equipment.

B. Related Work:
1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
2. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.
3. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.
4. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
5. Section 26 5600, EXTERIOR LIGHTING.
6. Section 26 5670, LIGHTING ACCEPTANCE TESTING.

1.3 SUBMITTALS

A. Submit in accordance with Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings:
1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include electrical ratings, dimensions, mounting, details, materials, terminations, wiring and connection diagrams, photometric data, ballasts, luminaires, lamps and controls.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM).

C. American National Standards Institute (ANSI).

D. Aluminum Association Inc. (AA).

E. Illuminating Engineering Society of North America (IESNA).

F. National Electrical Manufacturers Association (NEMA).

G. National Fire Protection Association (NFPA).

H. Underwriters Laboratories, Inc. (UL).

1.5 DEFINITIONS

A. Lighting terminology used herein is defined in IES

B. Exception: The term "driver" is used herein to cover both drivers and power supplies, where applicable.

C. Clarification: The term "LED light source(s)" is used herein per IES to cover LED package(s), module(s), and array(s).

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be in accordance with CEC, UL, ANSI, and as shown on the drawings and specified.

2.2 LIGHTING FIXTURES (LUMINAIRES)

A. Shall be in accordance with NFPA 70, UL 1598 and shall be as shown on drawings and as specified. All luminaires shall have been certified to the California Energy Commission by its manufacturer to comply with the efficiency standards as per California Code of Regulations Title 24, Part 6, Section 111 referencing the Appliance Efficiency Regulations in Title 20. Post certification with building permit.

B. Sheet Metal:
1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight (unless intentionally curved) and parallel to each other as designed.
2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
3. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner.

a. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, and latches shall function easily by finger action without the use of tools.

C. Ballasts shall be serviceable while the fixture is in its normally installed position, and shall not be mounted to removable reflectors or wireway covers.

D. Recessed fixtures shall be of the type approved for the ceiling and insulation conditions and appropriate for the installation location. Insulation must be held back from the fixture to provide manufacturers' recommended clearances for proper operation. Thermal tripping shall be the installer's responsibility to correct. Where installed in fire rated ceilings, coordinate installation of fire rated enclosures around the ceiling penetrations. Fixtures shall contain the proper through wiring capacity for that which is shown on the plans.

E. Recessed fixtures shall be provided with the appropriate trims and hardware compatible with the ceiling type shown. Plaster frames are required where plaster or gypsum board ceilings are encountered.

F. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive screws, chains, captive hinges or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.

G. Metal Finishes:
1. The manufacturer shall apply standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking.
2. Interior light reflecting finishes shall be white with not less than 85 percent reflectances, except where otherwise specified on the drawing.
3. Exterior finishes shall be as shown on the drawings.

H. Provide all lighting fixtures with a specific means for grounding metallic wireways and housings to an equipment grounding conductor.

I. Light Transmitting Components for Fluorescent Fixtures:
1. Shall be 100 percent virgin acrylic plastic or water white, annealed, crystal glass.
2. Flat lens panels shall have not less than 1/8 inch of average thickness. The average thickness shall be determined by adding the maximum thickness to the minimum unpenetrated thickness and dividing the sum by 2.
3. Unless otherwise specified, lenses, diffusers and louvers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction of the lens without distortion or cracking.

J. Recessed LED fixtures shall be manufactured specifically for compact fluorescent or LED lamps with ballasts or drivers integral to the fixture. Assemblies designed to retrofit fixtures are prohibited except when described in this fashion. Fixtures shall be designed for lamps as specified.

K. Provide fixtures with a U.L. listing for shower or shower rating above shower or tub areas.

2.3 LED LUMINAIRE REQUIREMENTS

A. General Requirements:
1. Luminaire shall have an external label per ANSI C136.15
2. Luminaire shall have an internal label per ANSI C136.22.
3. Luminaires shall start and operate in -20°C to +40°C ambient.
4. LED light source(s) and driver(s) shall be RoHS compliant.

2.5 LED DRIVER

A. Driver
1. Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperatures as indicated.
2. Shall accept the voltage or voltage range indicated, and shall operate normally for input voltage fluctuations of plus or minus 10 percent. Consistent with NEMA SSL 1.
3. Shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.

B. Electromagnetic interference
1. Shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
2. Shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

C. The following shall be in accordance with corresponding sections of ANSI C136.37
1. Wiring and grounding
2. All internal components shall be assembled and pre-wired using modular electrical connections.
3. Mounting provisions
4. Terminal blocks for incoming AC lines
5. Latching and hinging
6. Ingress protection

2.6 LAMPS

A. Provide lamps for all luminaires.

B. Lamps, coated or clear as recommended by luminaire manufacturer to provide for maximum luminaire efficiency in luminaire used. Provide coated lamps for all interior luminaires.

C. For interior use, all metal halide lamps installed in a common area of building are of the same manufacturer's production run. Color discontinuities after initial "burn in" are unacceptable and shall be replaced if deemed unacceptable to Owner. All indoor HID lamps shall be coated unless otherwise noted.

D. Position oriented lamps shall be used in all horizontal mounted lamp position fixtures. Universal lamp is not acceptable in horizontal lamp position.

E. LED LIGHT SOURCE
1. Minimum Color Rendering Index (CRI): 60.

2. Correlated Color Temperature (CCT)
   a. CCT shall be as listed in Table 1 below:

Table 1. Allowable CCT

Manufacturer-Rated Nominal CCT (K)	Allowable LM-79 Chromaticity Values
	Measured CCT (K)
2700	2580 to 2870
3000	2870 to 3220
3500	3220 to 3710
4000	3710 to 4260
4500	4260 to 4746
5000	4745 to 5311
5700	5310 to 6020
6500	6020 to 7040

2.7 INSTALLATION

A. Installation and furnishing of lighting fixtures shall be in accordance with the CEC, manufacturer's instructions and as shown on the drawings or specified. Fixtures damaged in transit and storage prior to completion shall be replaced at Contractor's expense.

B. Align, mount and level the lighting fixtures uniformly.

C. Avoid interference with and provide clearance for equipment. Where the indicated locations for the lighting fixtures conflict with the locations for equipment, change the locations for the lighting fixtures by the minimum distances necessary as approved by the Architect. The Architectural reflected ceiling plan will take precedence over electrical plans.

D. For suspended lighting fixtures, the mounting heights shall provide the clearances between the bottoms of the fixtures and the finished floors as shown on the drawings.

E. Lighting Fixture Supports:
   1. Contractor shall provide support for all of the fixtures independent of suspended ceilings. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.
   2. Shall maintain the fixture positions after cleaning and relamping.
   3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
   4. Hardware for recessed fluorescent fixtures:
   5. Fixtures shall be supported as detailed on drawings and as required by DSA standards.
   6. Installation: Fixtures shall be securely mounted on ceilings and walls with appropriate fastening devices. "Drop-in" type T-bar fixtures shall be secured with #12 gauge safety "earthquake wires" as described by California Code of Regulations Title 24 Part 2, Chapter 47. "Earthquake clips" will be required for fastening to the T-bar system in addition to safety wire. Surface mounted fluorescent fixtures shall be solidly screwed or clipped into framing above drywall with 4-#10 sheet metal screws into each fixture. Provide blocking for screw supports behind all surface mounted lighting fixtures weighing more than 15 lbs.
   7. Surface mounted lighting fixtures:

a. Fixtures shall be bolted against the ceiling independent of the outlet box at four points spaced near the corners of each unit. The bolts shall be minimum ¼-20 bolt, secured to structural ceiling. Non-turning studs may be attached to the building structure by 12 gauge safety hangers.

8. Fixtures mounted in open construction shall be secured directly to the building structure with approved bolting and clamping devices.
9. Single or double pendent mounted lighting fixtures:
   a. Each stem shall be supported by an approved outlet box, mounted swivel joint and canopy which holds the stem captive and provides spring load (or approved equivalent) dampening of fixture oscillations. Outlet box shall be supported vertically from the building structure and be allowed to swing to a 45 degree angle.
10. Outlet boxes for support of lighting fixtures (where permitted) shall be secured directly to the building structure with approved devices or supported vertically in a hung ceiling from the building structure with a nine gauge wire hanger, and be secured by an approved device to a main ceiling runner or cross runner to prevent any horizontal movement relative to the ceiling.

F. Furnish and install the specified lamps for all lighting fixtures as part of this project.

G. Coordinate between the electrical and ceiling trades to ascertain that approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges), to match the ceiling system being installed.

H. Bond lighting fixtures and metal accessories to the grounding system as specified in Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

I. At completion of project, relamp all fixtures which have failed/burned-out lamps. Clean all fixtures, lenses, diffusers and louvers that have accumulated dust/dirt during construction.

J. Provide unswitched leg of interior lighting branch circuit to integral emergency battery pack light fixtures, exit signs and night lights as applicable per lighting plans.

K. Wallmount fixtures in walkway areas shall not project more than 4 inches from wall when projection occurs lower than 80 inches.

END OF SECTION

SECTION 26 5600

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of exterior luminaires, controls, poles and supports.

1.2 RELATED WORK

A. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.

B. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.

C. Section 26 0519, LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.

D. Section 26 0546.13, ELECTRIC UTILITY SYSTEMS: Underground handholes and conduits.

E. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

F. Section 26 5100, INTERIOR LIGHTING.

G. Section 26 5670, LIGHTING ACCEPTANCE TESTING.

1.3 SUBMITTALS

A. Submit in accordance with Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include electrical ratings, dimensions, mounting, details, materials, required clearances, terminations, wiring and connection diagrams, photometric data, ballasts, poles, luminaires, effective projected area (EPA), lamps and controls.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM).

C. American Concrete Institute (ACI).

D. American National Standards Institute (ANSI).

E. Aluminum Association Inc. (AA).

F. Illuminating Engineering Society of North America (IESNA).

G. National Electrical Manufacturers Association (NEMA).

H. National Fire Protection Association (NFPA).

I. Underwriters Laboratories, Inc. (UL).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Poles: Do not store poles on ground. Store poles so they are at least one foot above ground level. Do not remove factory-applied pole wrappings until just prior to installation of pole.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be in accordance with CEC, UL, ANSI, as shown on the drawings and as specified.

2.2 POLES

A. General:
   1. Poles shall be steel or aluminum as specified in fixture schedule and as shown on the drawings. Finish shall be as approved by the Architect. Assume custom color for bidding.
   2. The pole and arm assembly shall be designed for wind loading of 100 miles per hour, with an additional 30 percent gust factor, supporting luminaire(s) having the effective projected areas indicated as per manufacturer data.
   3. Poles shall anchor-bolt type designed for use with underground supply conductors. Poles shall have gasketed handhole with a minimum clear opening of 2.5” x 5”. Handhole cover shall be secured by stainless steel captive screws.
   4. Provide a steel grounding stud opposite hand hole openings.

B. Provide a base cover matching the pole in material and color to conceal the mounting hardware pole-base welds and anchor bolts.

C. Hardware: All necessary hardware shall be 300 series tamperproof stainless steel.

D. Types:
1. Aluminum: Provide aluminum poles manufactured of corrosion resistant AA AAH35.1 aluminum alloys conforming to AASHTO LTS-4 for Alloy 6063-T6 or Alloy 6005-T5 for wrought alloys, and Alloy 356-T4 (3,5) for ASTM B108-01 cast alloys. Poles shall be seamless extruded or spun seamless type. Provide a pole grounding connection designed to prevent electrolysis when used with copper ground wire. Base covers for aluminum poles shall be cast from 356-T6 aluminum alloy in accordance with ASTM B108-01.
2. Steel: Provide steel poles having minimum 11-gage steel with minimum yield/strength of 48,000 psi and iron-oxide primed factory finish. Base covers for steel poles shall be structural quality hot-rolled carbon steel plate having a minimum yield of 36,000 psi.

2.3 FOUNDATIONS FOR POLES

A. Foundations shall be cast-in-place concrete.

B. Foundations shall support the effective projected area of the specified pole, arm(s), luminaire(s), and all accessories specified under wind conditions as specified in this section.

C. Place concrete in spirally wrapped treated paper forms for round foundations, and construct forms for square foundations.

D. Rub-finish and round all above-grade concrete edges to approximately 1/4” radius unless otherwise detailed.

E. Concrete shall have 3000 psi minimum 28 day compressive strength.

F. Anchor bolt assemblies and reinforcing of concrete foundations shall be as shown on the drawings and meet ACI 318. Anchor bolts shall be in a welded cage or properly positioned by the tie wire to stirrups.

G. Install a copperclad ground rod, not less than 5/8” diameter by 10’ long in pullbox adjacent to each fixture. Where rock or layered rock is present, drill a hole not less than 2” in diameter and 6’ deep, backfill with tamped fine sand and drive the rod into the hole. Bond the rod to the pole with not less than number 6 AWG bare copper wires. The method of bonding shall be approved for the purpose.

H. After leveling of pole grout base solid between plate and footing with dry pack concrete for vibration reduction.

2.4 LUMINAIRES

A. UL 1598 and ANSI C136.17. Luminaries shall be weatherproof, heavy duty, outdoor types designed for efficient light utilization, adequate dissipation of lamp and ballast heat and safe cleaning and relamping.

B. Light emitting diode (LED)-based solid state lighting (SSL) products shall be factory tested in accordance to the International Engineering Society (IES) LM-79 recommendations and meet ANSI C78.377-2008 standards.

C. LED light sources shall be factory tested in accordance to IES LM-80 recommendations.

D. LED-based SSL product shall incorporate an external heat sink, integral to the luminaire.

E. IESNA HB-9 and RP-8 light distribution pattern types shall be as indicated on the drawings.

F. Incorporate associated ballasts and drivers within the luminaire housing.

G. Lenses shall be frame-mounted heat-resistant, borosilicate glass, prismatic refractors. Attach the frame to the luminaire housing by hinges or chain.

H. Pre-wire internal components to terminal strips at the factory.

I. Bracket mounted luminaries shall have leveling provisions and clamp type adjustable slip-fitters with locking screws.

J. Materials shall be rustproof. Latches and fittings shall be non-ferrous metal.

K. LED-based SSL luminaires shall be manufactured specifically for LED lamps with drivers integral to the luminaire housing.

2.5 LAMPS

A. Luminaires shall be listed for the lamp specified on the associated electrical plans. Install the proper lamps in every luminaire installed.

B. Lamps shall be clear or coated as recommended by luminaire manufacturer to provide for maximum luminaire efficiency in fixture used.

2.6 LED-BASED SOLID STATE DRIVERS

A. Shall be listed by either U.L. or equal listing agency and comply with IEEE C.62.41-1991, Class A operation.

B. Provide a minimum power factor of 0.9.

C. Minimum operating temperature appropriate for outdoor environments.

D. Shall operate at a frequency greater than or equal to 120Hz.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lighting in accordance with the CEC, as shown on the drawings, and in accordance with manufacturer's recommendations.

B. Poles:
1. Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 1.57 rad 90 degrees at the bottom end. Provide galvanized nuts, washers, and ornamental covers for anchor bolts. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit elbow. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location.
2. After the poles have been installed, shimmed and plumbed, grout the spaces between the pole bases and the concrete base with non-shrink concrete grout material. Provide a plastic or copper tube, of not less than 3/8" inside diameter, through the grout tight to the top of the concrete base for moisture weeping.
3. Attach pole base cover to pole flange with set screws.

C. Foundation Excavation: Depth shall be as indicated on drawings. Dig holes large enough to permit the proper use of tampers to the full depth of the hole. Place backfill in the hole in 6" maximum layers and thoroughly tamp. Place surplus earth around the pole in a conical shape and pack tightly to drain water away.

D. Photocell Switch Aiming (where applicable): Aim switch according to manufacturer's recommendations. Mount switch on or beside each luminaire when switch is provided in cast weatherproof aluminum housing with swivel arm or set adjustable window slide for proper footcandles photocell turn-on.

3.2 GROUNDING

A. Ground noncurrent-carrying parts of equipment including metal poles, luminaries, mounting arms, brackets, and metallic enclosures as specified in Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or alloyed connectors suitable and listed for this purpose.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 26 5670

LIGHTING ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:
   1. The Contractor shall be responsible for the Certificate of Acceptance, but coordinate with the Certified California Lighting Controls Test Technician to assure that all required documents have been filed with and approved by the enforcement agency prior to receiving a final occupancy permit. The Certificate of Acceptance will indicate that the Contractor has demonstrated acceptance requirements of the plans and specifications, that current requirements for installation certificates are met, and that currently required operating and maintenance information (as well as the Certificate of Acceptance) were provided to the building Owner.
   2. Testing, evaluation and calibration of lighting controls equipment provided, installed and connected in Division 26.
   3. Documentation of test results, completion of "Certificate of Acceptance" and "Certificate of Installation" forms and filing with the enforcement agency for approval.
   4. Specific Jobsite Conditions:
      a. Acceptance testing must be tailored for each specific design, job site, and climactic conditions. While the steps for conducting each test remain consistent, the application of the tests to a particular site may vary. The Contractor shall review the construction documents and include all required time, material, testing equipment, etc. as required to complete the requirements of this section.

B. Related Work:
   1. Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.
   2. Section 26 5100, INTERIOR LIGHTING.
   3. Section 26 5600, EXTERIOR LIGHTING.
   4. Section 26 0926, LIGHTING CONTROL SYSTEM.
   5. Section 26 0900, CONTROLS AND INSTRUMENTATION.

1.3 REFERENCES

A. Acceptance Testing Criteria: 2019 Building Energy Efficiency Standards Non-Residential Compliance Manual.

1.4 SYSTEM DESCRIPTION

A. Performance Requirements:
1. All material, equipment, labor and technical supervision to perform tests, calibrations and documentation specified herein.

B. Scope of Testing, Evaluation and Calibration (as applicable):
1. Automatic (master) time switches.
2. Occupancy sensors.
3. Automatic daylighting controls.
4. Photo electric sensors.
5. Daylighting controls.
6. Outdoor astronomical time switches.
7. Area controls.

1.5 SUBMITTALS

A. Submit in accordance with Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.

B. Test Reports:
1. Written record of all tests and completion of forms included in this section.
2. At completion of project, assemble a final test report. Submit report to the enforcement agency and the Owner prior to final occupancy to include:
   a. Summary of project.
   b. Description of systems and equipment tested.
   c. Visual inspection report.
   d. Description of tests.
   e. Test results.
   f. Conclusions and recommendations.
3. Report shall be bound in booklet form, include on the Contractor's letterhead the title of the report and the systems tested.

C. Constructability Plan Review
1. The Contractor shall review the construction drawings and specifications to understand the scope of the acceptance tests and raise critical issues that might affect the success of the acceptance tests prior to starting construction. Any constructability issues associated with the lighting system should be forwarded to the design team for review/modifications prior to equipment procurement and installation. The Contractor shall submit on company letterhead, with the lighting control equipment required by Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL, 1.4B, a letter confirming that the constructability review has been completed and their company has reviewed and is prepared to complete the lighting acceptance testing required by this section.

PART 2 - PRODUCTS

2.1 FORMS

A. Lighting Installation forms and verification procedures for lighting systems that require acceptance testing can be downloaded from the following website: www.energy.ca.gov/2015publications/CEC-400-2015-033/appendices/forms/NRCI

B. Lighting Acceptance forms are to be provided by a Certified California Lighting Controls Acceptance Test Technician. The California Energy Commission adopted changes to the California building Efficiency Standards (Title 24, Parts 1 and 6) that require lighting controls and devices to be certified as properly installed and operational, prior to issuance of occupancy permits. All Acceptance Technicians must be employed by an Acceptance Test employer that provides support as well as quality control. Certified California Lighting Controls Acceptance Test Technicians can be found at the following website: www.calctp.org/acceptance-technicians/contractors

C. These completed forms will be the deliverable product to the enforcement agency and Owner as described in 1.4 of this section.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Tests:
1. Contractor's Responsibilities:
   a. Perform all required tests required by this section.
   b. Schedule testing with building Owner.
   c. Provide Installation forms
   d. Acceptance forms provided by California Certified Lighting Controls Technician hired by Contractor.
   e. Calibration of equipment such as light meters, photo electric controls, etc.
   f. Programming of time switches (interior/exterior lighting) for operations as directed by the Owner.

3.2 ADJUSTING

A. Final Settings: The Contractor shall be responsible for implementing all final settings and adjustments on controls equipment as required for a complete and operating system.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

Section 27 0500
Common Work Results For Communications

REFER TO APPENDIX C FOR CITY CABLING STANDARDS SPECIFICATIONS

END OF SECTION

This page intentionally left blank

Section 32 1416
Brick Unit Paving

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Brick Pavers

B. Brick Edge Band

C. Brick at Stairs

D. Brick at Site Walls

E. Accessories - Sealer and Paint at Stair Nosings

F. Sand Materials

G. Reinforcement.

H. Mixes

1.02 RELATED REQUIREMENTS

A. Section 09 9113 - Exterior Painting - Graffiti Guard at brick site walls and all vertical brick.

1.03 REFERENCE STANDARDS

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

B. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

C. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.

D. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

E. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

F. ASTM C902 - Standard Specification for Pedestrian and Light Traffic Paving Brick; 2015.

1.04 SUBMITTALS

A. See Section 5 for submittals procedures.

1.05 QUALITY ASSURANCE

A. Paver Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with 5 years documented experience.

1.06 MOCK-UP

A. Install setting bed, brick pavers, curbs and border, and accessories to pattern indicated.

B. Size: 100 sq ft.

C. Mock-up may remain as part of the Work.

1.07 FIELD CONDITIONS

A. Do not install mortar when surrounding air or substrate surface temperature is below 50 degrees F prior to, during, and 48 hours after completion of work.

B. Do not install mortar when surrounding air or substrate surface temperature is above 90 degrees F during and 48 hours after completion of the work.

C. Do not install mortar when wind velocity exceeds 15 mph or relative humidity exceeds 50 percent.

D. At end of working day, or during rainy weather, cover work exposed to weather with waterproof coverings, securely anchored.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Brick Pavers:
   1. HC Muddox www.hcmuddox.com

2.02 BRICK PAVERS

A. Brick Paving Types 1-5
   1. Commercial Standard Brick (solid).
   2. Face Size: 3 3/4" x 8" inches.
   3. Thickness: 2 1/2 inches.
   4. Exposed Surface Texture: Wirecut.
   5. Edges: Square.
   6. Colors (Locations Indicated on Plans):
      a. Paving Type 1: Old Town Red
      b. Paving Type 2: Mountain Rose
      c. Paving Type 3: Dusty Rose
      d. Paving Type 4: Summer Wheat
      e. Paving Type 5: Sutter Gold

B. Brick Edge Band
   1. Commercial Standard Brick (solid).
   2. Face Size: 3 3/4 x 8" inches
   3. Thickness: 2 1/2 inches
   4. Exposed Surface Texture: Wirecut
   5. Edges: Square.
   6. Color: Ebony

C. Brick Paver at Stairs
   1. Commercial Standard Brick (solid).
   2. Face Size: 3 3/4" x 8" inches
   3. Thickness: 2 1/2 inches
   4. Exposed Surface Texture: Wire Cut
   5. Edges: Square.
   6. Color: Ebony (Nosing and Riser) and Mountain Rose (Cut bricks on tread)

D. Brick at Site Walls
   1. Commericial Standard Brick (solid)
   2. Face Size: 3 3/4" x 8" inches.
   3. Thickness: 2 1/2 inches.
   4. Exposed Surface Texture: Smooth/Wirecut depending on face used
   5. Edges: Square.
   6. Color: Spanish Moss

2.03 ACCESSORIES

A. Brick Paving Sealer
   1. Prosoco "Satin Guard WB" or approved equal.

B. Brick Stair Nosing Paint
   1. Anti-slip urethane coating
   2. Product: Tuff Grip Extreme Aggressive Action Non-Skid Floor Paint
   3. Color: Sand
   4. Options: Tuff Grip Corsslinker urethane activator
   5. Submit samples for approval

2.04 SAN MATERIALS

A. Sand for Setting Bed: Clean washed concrete sand, free of fines, complying with gradation requirements of ASTM C33/C33M for fine aggregates.

B. Polymeric Sand: Fine sand complying with ASTM C144 combined with polymer binders for creating semi-solid joints between pavers.
   1. Color: Tan.

C. REINFORCEMENT
   1. Masonry Tie: Wire-Bond Dovetail Corrugated Tie, galvanized steel.

D. MIXES
   1. Mortar Setting Bed and Joint

2. Joint Mortar: Type S Portland cement mix complying with the following:
   a. Compressive Strength (28 day): 3000 psi.
   b. Slump: 1 to 2 inches.
   c. Air Entrained: 5 to 7 percent.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate is ready to support pavers and imposed loads.

B. Verify gradients and elevations of substrate are correct.

C. Verify dry weather forecast without rain for a minimum of 24 hours with temperatures above 55 degrees Fahrenheit.

D. Verify that pavers are completely dry prior to polymeric sand installation.

3.02 INSTALLATION - SAND SETTING BED

A. Spread sand evenly over prepared substrate surface to a nominal thickness of 1-1/2 inches.

B. Dampen and roller compact sand to level surface.

C. Screed and scarify top 1/2 inch of sand.

D. Place paver units in herringbone pattern, from straight reference line.

E. Place half units or special shaped units at edges and interruptions. Maintain tight joints. Machine saw partial units.

F. Sprinkle sand over surface and sweep into joints. Moisten joints and recover with additional sand until firm joints are achieved. Remove excess sand.

G. Tamp and level paver units with mechanical plate vibrator until units are firmly bedded, level, and to correct elevation and slope gradient.

3.03 CLEANING

A. Do not clean pavers until pavers and mortar are dry.

B. Clean soiled surfaces using cleaning solution. Do not harm pavers, joint materials, or adjacent surfaces.

C. Use non-metallic tools in cleaning operations.

D. Rinse surfaces with clean water.

E. Broom clean paving surfaces. Dispose of excess sand.

3.04 PROTECTION

A. Do not permit traffic over unprotected paver surface.

B. Do not permit traffic for 48 hours after pavement placement.

3.05 MAINTENANCE

A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

END OF SECTION

APPENDIX C – CITY COMMUNICATIONS CABLING SPECIFICATIONS

SECTION 17010
COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 GENERAL

1.1 SUMMARY:

A. Section includes, but is not necessarily limited to:
   1. Common standards and procedures for the Communications Work.
   2. Design, engineer and provide complete, all means of support, suspension, attachment, fastening, bracing, and restraint (hereinafter "support") of the Communications Systems. Provide engineering of such support by parties licensed to perform work of this type in the Project jurisdiction.

B. Provisions of this Section apply to Communications Work, including the following Sections:
   1. Section 17026 - Grounding and Bonding for Communications Systems
   2. Section 17029 - Hangers and Supports for Communications Systems
   3. Section 17033 - Conduits and Backboxes for Communications Systems
   4. Section 17036 - Cable Trays for Communications Systems
   5. Section 17039 - Surface Raceways for Communications Systems
   6. Section 17053 - Identification for Communications Systems
   7. Section 17100 - Structured Cabling, Basic Materials and Methods
   8. Section 17116 - Communications Cabinets, Racks, Frames and Enclosures
   9. Section 17119 - Communications Termination Blocks and Patch Panels
   10. Section 17123 - Communications Cable Management
   11. Section 17126 - Communications rack Mounted Power Protection and Power Strips
   12. Section 17130 - Communications Indoor Backbone Cabling
   13. Section 17150 - Communications Horizontal Cabling

1.2 REFERENCES:

A. Usage: In accordance with Section 01110 – Summary of Work.

B. American National Standards Institute (ANSI)
   1. ANSI/TIA/EIA-568-B.1-200l, Commercial Building Telecommunications Cabling Standard – Part l: General Requirements
   2. ANSI/TIA/EIA-568-B.2-200l, Commercial Building Telecommunications Cabling Standard - Part2: Balanced Twisted Pair Cabling Components
   3. ANSI/TIA/EIA-568-B.3-2000, Optical Fiber Cabling Components Standard
   4. ANSI/TIAIEIA-606-A-2002, Administration Standard for Commercial Telecommunications Infrastructure

1.3 DEFINITIONS

A. General Abbreviations used in these specifications. Refer additionally to the abbreviations list appearing on the Drawings.
   1. ADA Americans With Disabilities Act
   2. AFC Above Finished Ceiling
   3. AFF Above Finished Floor

4. BDF Building Distribution Facility
5. BICSI Building Industry Consulting Service International
6. BLDG Building
7. CAT Category
8. CD Campus Distributor
9. CL Centerline
10. DIY Division
11. (E) Existing
12. EF Entrance Facility
13. ER Equipment Room
14. FBO Furnished By Owner
15. FD Floor Distributor
16. HR Home Run
17. ID Inside Diameter
18. LAN Local Area Network
19. MAX Maximum
20. (N) New
21. NIC Not In Contract
22. OD Outside Diameter
23. OFE Owner Furnished Equipment
24. PSRH Project Standard Receptacle Height
25. PSSH Project Standard Switch Height
26. TR Telecommunications Room
27. TVP Typical
28. UON Unless Otherwise Noted.

B. Reference to Named Products.
   1. Selected Item: Item so noted was selected based on comparative testing of similar products. Procedure for determination of equivalence is noted in the specification for the item(s).
   2. System Design Basis: Item so noted interacts with other system items to produce total system function. Substitution of this item may require coordinated substitution of other system items.
   3. Design Basis: Item so noted was used as basis for system drawings to establish features, size, etc. Use of specified equivalents may require adjustment of physical layout or wiring, but does not affect system function. No preference is implied.

1.4 SUBMITTALS

A. Comply with Section 01300 - Administrative Requirements and the following:
   1. Submit all materials for review arranged in same order as Specifications, individually referenced to Specification Section, Paragraph and Contract Drawing number. Conform in every detail as applies to each referencing Section.
   2. Submit 8 ½ "x 11" items bound in volumes and drawings in edge bound sets. Submit all drawings on sheets of the same size.

3. Make each specified submittal as a coordinated package complete with all information specified herein. Incomplete or uncoordinated submittals will be returned with no review action.
4. Progress Schedule: Comply with 01300 - Administrative Requirements.

B. Manufacturer's Product Data:
1. Manufacturer's Product Data Sheets. Collate in sequence of List of Materials:
2. Data sheet for each item in each Communications Section, including all accessories, clearly marked for proposed product.
3. Material Safety Data Sheet, where applies.
4. List of Materials Schedule. For each item, include:
   a. Referencing Specification Section
   b. Referencing Paragraph
   c. Referencing Drawing, if specified only on plans
   d. Manufacturer
   e. Model number
   f. Listing, including name of Nationally Recognized Testing Laboratory.
   g. Precede each submittal book with a summary schedule, with columns for each item above and rows for each item submitted.
      i. Example:

Specification Section	Paragraph	Contract Drawing Reference	Manufacturer	Model No.	UL Listed/ ETL Verified
17010	2.03C		XYZ	123	Y
17150	2.07Al		AAA	34-56	Y
		T4.2	ZZY	456	Y

1.5 QUALITY ASSURANCE

A. Procedures: In accordance with Section 01400 - Quality Requirements.

B. Contractor may design data and voice cabling and subcontract the installation to another contractor or perform both design and installation. In either case, all contractors must meet the qualifications for any portion of the work they perform.

C. Qualifications for contractors who perform DESIGN work:
1. Any person who designs any data or voice cabling for this project must be a BICSI Registered Communication Distribution Designer (RCDD®) and a full-time employee of Contractor. Two (2) copies of RCDD certification(s) must be submitted during the pre-construction meeting.
2. Any person who designs any data or voice cabling for this project shall be thoroughly familiar with the cabling methods set forth in the latest release of the BICSI Telecommunications Distribution Methods Manuals (TDMM), latest edition.
3. Contractor shall submit two (2) copies of documentation of at least five (5) years experience in design of structured cabling systems during the pre-construction meeting.
4. Contractor shall submit two (2) copies of a written list of completed projects equivalent in size and complexity to this project, with a reference name, title,

company, address, and telephone number for each during the pre-construction meeting.

D. Qualifications for contractors who perform INSTALLATION work:
   1. Contractor must have at least one person acting as project manager/engineer for this project who is both a BICSI RCDD and a full-time employee of Contractor. Two (2) copies of RCDD certification(s) must be submitted during the pre-construction meeting.
   2. Contractor shall be thoroughly familiar with the cabling methods set forth in the BICSI TDMM, latest edition, and unless otherwise specified, shall supervise the installation in accordance with the recommendations and practices outlined in the BICSI TDMM, latest edition.
   3. Contractor shall be an approved Ortronics Certified Installer or Berk-Tek Certified OASIS Integrator. The Telecommunications contractor is responsible for workmanship and installation practices in accordance with the Ortronics CI/CIP Program and Berk-Tek OASIS Program.
   4. Contractor shall submit during the pre-construction meeting two (2) copies of documentation of at least five (5) years experience in installation and maintenance of structured cabling systems.
   5. Contractor shall submit during the pre-construction meeting two (2) copies of a written list of completed projects equivalent in size and complexity to this project, with a reference name, title, company, address, and telephone number for each.
   6. During the pre-construction-meeting, Contractor shall submit two (2) copies of a written list of qualified technicians assigned to this project, including relevant manufacturer training programs and years of related experience completed by each. At least 30 percent of the copper installation and termination crew must be certified by Berk-Tek and Ortronics or by BICSI at the Technician level. At least 20 percent of the optical fiber installation and termination crew must be certified by Berk-Tek and Ortronics or other industry-recognized organizations in optical fiber installation and testing.

E. Structured Cabling System shall qualify for an Ortronics NetClear GT2 25-year manufacturer warranty. Contractor shall responsible for the following:
   1. Register project for warranty PRIOR to the start of installation in conformance with Ortronics warranty requirements.
   2. Submit final Bill of Materials and certified test results to Ortronics within (5) business days of completing installation and certification testing.
   3. Deliver warranty confirmation letter and certificate to Owner's representative.

F. Test Plan
   1. Provide a complete and detailed test plan for the Telecommunications cabling system including a complete list of test equipment for the UTP and optical fiber components and accessories ten (10) business days prior to the proposed test date. Include procedures for certification, validation, and testing.

G. Designated Supervisor

1. Provide a designated supervisor present and in responsible charge in the fabrication shop and on the project site during all phases of installation and testing of the Work of this section. This supervisor shall be the same individual throughout the execution of the Work unless illness, loss of personnel, or other circumstances reasonably beyond the control of Contractor intervene.

H. Reference Documents: At all times when the work is in progress, maintain at the workplace, fabrication shop or Project Site as applies.
   1. A complete set of the latest stamped, actioned submittals of record.

I. Test Equipment
   1. Requirements:
      a. Maintain and operate test equipment at the fabrication shop and the job site for both routine and Certification Testing of the Work of this section.
      b. Maintain test equipment at the job site while testing is in progress from installation of equipment racks until Owner Acceptance of this Work; thereafter remove all of this test equipment from the job site.
      c. Unless otherwise indicated, test equipment shall remain property of Contractor.
      d. Provide all required test cables and adapters.
         a. Provide equipment with traceable calibration, with calibration date not greater than one (1) year prior to the date of the use of the equipment to perform the specified testing.
   2. Equipment: Specified in individual Sections.

J. Standard Products
   1. Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.
      a. Alternative Qualifications. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
   2. Material and Equipment Manufacturing Date.
      a. Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.6 REGULATORY REQUIREMENTS

A. Regulations Applicable: Including but not limited to those defined in Section 01110 - Summary of Work.
   1. Nothing in the Contract Documents shall be construed to permit Work not conforming to applicable laws, ordinances, rules, or regulations.
   2. Safety Agency Listing: All devices provided under the Work of this Section which are connected to the Project electrical system shall be listed by a Nationally Recognized Testing Laboratory, and shall be so labeled.
   3. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Owner's Representative. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

1.7 DELIVERY. STORAGE, AND HANDLING

A. Procedures:
   1. In accordance with Section 01600 - Product Requirements and as specified in the individual sections of Division 17.

B. General
   1. Provide protection from weather, moisture, extreme heat and cold, dirt, dust, and other contaminants for Telecommunications cabling and equipment placed in storage.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Connecting hardware shall be rated for operation under ambient conditions of 32 to 140 degrees F and in the range of 0 to 95 percent relative humidity, non-condensing.

1.9 SEQUENCING

A. Comply with Section 01110 - Summary of Work, 01300 - Administrative Requirements, and the following:
   1. Sequence.
      a. Within (10) days of issuance of the Notice to Proceed, Owner's Representative will provide the Contractor copies of the Contract Drawings showing station outlets with final Owner assigned backbone cable and horizontal jack and cable ID numbers.
      b. Reproduceables, as applies:
         i. 1 set of reproducible bond.
         ii. CAD files: 1 set
      c. Contractor shall use drawings provided in executing the work of the Project.

1.10 OPERATING AND MAINTENANCE DATA

A. Commercial off the shelf manuals shall be furnished for operation, installation, configuration, and maintenance of products provided as a part of the Telecommunications cabling and pathway system.

1. Submit operations and maintenance data in accordance with Section 01770 - Closeout Procedures and as specified herein not later than 2 months prior to the date of beneficial occupancy.

1.11 PROJECT RECORD DOCUMENTS

A. Comply with Section 01770 - Closeout Procedures, and the following:
   1. Record Drawings
      a. CAD.
         i. Use a Computer Aided Drafting (CAD) system in the preparation of record drawings for this Project. CAD system shall produce files in AutoCAD® .DWG format, latest version at time of bid.
      b. Except where prohibited by Contract, Owner's Representative will furnish CAD backgrounds in AutoCAD® .DWG format, latest version at time of bid, for use by the Contractor in preparing Record Drawings.
      c. CD copy of Record Drawings: Provide 2 separate disc copies of each drawing file in the format noted above. Submit of CD-R disk.

1.12 WARRANTY SERVICE

A. In addition to provisions of 01780 - Warranties, provide the following:
   1. Response Time: Provide a qualified technician familiar with the work at the Project Site within 24 hours after receipt of a notice of malfunction. Provide the Owner's Representative with telephone number attended 8 hours a day, 5 days a week, to be called in the event of a malfunction.

B. Provide all additional Warranties as defined in each Communication Systems Section.

1.13 ACCEPTANCE REVIEW AND TESTING PROCEDURES

A. Complete all Work of this section. Submit Test Report. Submit review copies of Operating and Maintenance Manuals, less reduced set of Record Drawings. Notify the Owner's Representative in writing that the Work of these Sections is complete and fully complies with the Contract Documents. Request Acceptance Review and Testing. The Owner's Representative will conduct Verification of Submitted Test Data, and otherwise direct testing and adjustment of this Work. These procedures may be performed at any hour of the day or night as required by the Owner's Representative to comply with the project schedule and avoid conflict with residents. Provide all specified personnel and equipment at any time without claim for additional cost or time.

B. Personnel: Provide services of the designated supervisor and additional technicians familiar with work of this section. Provide quantity of technicians as required to comply with project schedule.

C. In Addition, provide:
   1. All tools appropriate for performance of adjustment of and corrections to this Work. Include spare cable and connectors and specified tooling for application.
   2. Ladders, scaffolding and/or lifts as required to access high devices.
   3. All test equipment.

4. Complete set of latest stamped, actioned submittals of record for reference.
5. Complete set of manufacturer test reports.
6. Complete set of manufacturer's original operation, instruction and service manuals for each equipment item for reference.
    a. Demonstrate: Complete operation of all systems and equipment, including portable equipment.
    b. Adjust: As directed by the Owner's Representative.
    c. Correct: In timely manner, failure to comply with the Contract Documents, as reasonably determined by the Owner's Representative.

D. Temporary Equipment: Provide and operate, without claim for additional cost or time, temporary equipment and/or systems to provide reasonably equivalent function, as determined by the Owner's Representative, in place of the Work of this section which is incomplete or found not in conformance with the Contract Documents as of ten (10) business days prior to the scheduled completion date. Provide such temporary equipment until Acceptance of the Work of this section. Thereafter, remove such temporary equipment.

1.14 CLOSEOUT

A. Punch List: Perform any and all remedial work, at no claim for additional cost or time. Where required, re-test and re-submit certification test report(s). Notify the Owner's Representative of completion of Punch List.

B. Portable Equipment: Furnish all portable equipment and spares to the Owner's Representative, along with complete documentation of the materials presented. Where applicable, furnish portable equipment in the original manufacturer's packing.

C. Operating and Maintenance Data: Install framed operating and maintenance instructions. Submit manuals.

D. Project Record Documents: Submit print and digital copies. Digital files shall be in CAD system shall produce files in AutoCAD® .DWG format, latest version at time of bid.

E. Keys: If applicable, replace construction locks with permanent locks. Provide five (5) sets of keys to the Owner's Representative.

F. Training: Conduct specified training.

G. Warranty: Submit Contractor and Manufacturer Warranties dated to run from date of Acceptance of the Work of this section.

PART 2 PRODUCTS

2.1 GENERAL

A. Where a particular material, device, piece of equipment or system is specified directly, the current manufacturer's specification for the same shall be considered to be a part of these specifications, as if completely contained herein in every detail.

B. Each material, device or piece of equipment shall comply with all of the manufacturer's current published specifications for that item.

C. Products shall be made by manufacturers regularly engaged in the production of such products.

D. Provide quantity as shown on Contract Drawings, or as otherwise indicated.
E. Provide all auxiliary and incidental materials and equipment necessary for the operation and protection of the Work of this section as if specified in full herein.
F. Unless recycled content is specified, provide new materials.
G. Provide the manufacturer's latest design/model, permanently labeled with the manufacturer's name, model number and serial number.
H. Where products are of similar type or use, provide products of the same manufacturer, unless otherwise indicated.
I. Components:
    1. UL or third party certified. Cabling and interconnecting hardware and components for Telecommunications systems shall be UL listed or third party independent testing laboratory certified, and shall comply with NFPA 70 and conform to the requirements specified herein.
    2. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations, submit proof of such compliance.
        a. The label or listing by the specified organization will be acceptable evidence of compliance.
        b. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Owner's Representative.
        c. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.
J. Enclosures:
    1. Provide steel frames and enclosures designed and wired to eliminate all induced currents.
    2. Make bolted connections with self-locking devices.
K. Finishes: Any item or component of the Work of this section which is visible shall comply with the following:
    1. Finishes noted or scheduled on the Contract Drawings take precedence.
    2. Where design location requires that products, materials or equipment are visible to the public, no manufacturer's logos larger than 1/2 inch shall be visible. Unless otherwise noted or directed, neatly remove or permanently paint out such logos.
    3. Where finishes are not noted or otherwise defined in the Contract Documents, submit manufacturer's standard finish samples for selection by the Owner's Representative.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine existing conditions before starting work. Document conflicts in writing and submit to Owner’s Representative in a timely manner for resolution.

3.2 WIRING CLASSIFICATION AND RELATED

A. Audio Signal Wiring Classification:
   1. Type A-1: Microphone level wiring less than -30 dBu, 20 Hz to 20 kHz.
   2. Type A-2: Line level wiring -30 dBu to +24 dBu, 20 Hz to 20 kHz.
   3. Type A-3: Loudspeaker level or circuit wiring greater than +24 dBu, from 20 Hz to 20 kHz.

B. Video and Related Signal Wiring Classification:
   1. Type V-1: Baseband and composite video wiring I volt peak-to-peak into 75 ohms, 0 to 10.0 MHz.
   2. Type V-2: Synchronization and switching pulse wiring 4 volts peak-to-peak into 75 ohms, 15.62 to 15.75 kHz.
   3. Type V-3: Color subcarrier wiring 0 to 4 volts peak-to-peak into 75 ohms, 3.57 to 4.43 MHz.
   4. Type V-4: MATV system wiring 0.1 to 1000 microVolts peak-to-peak into 50 or 75 ohms, 47 to 890 MHz.

C. Control Signal Wiring Classifications:
   1. Type C-1: DC control wiring 0 to 50 volts.
   2. Type C-2: Synchronous control or data wiring 0 to 40 volts, peak-to-peak.
   3. Type C-3: AC control wiring 0 to 48 volts, 60 Hz.

D. Additional Wiring Classifications:
   1. Type M-1: DC power wiring 0 to 48 volts.
   2. Type M-2: AC power wiring greater than 50 volts, 60 Hz.
   3. Wiring Combinations.

E. Except as indicated herein, conduit, wireways and cable bundles shall contain only wiring of a single classification. The following combinations are acceptable in conduit, or cable harnesses. Additional acceptable combinations may be indicated on the Drawings.
   1. Types A-1, C-1, and M-1.
   2. Types A-2, C-1, C-2, and M-1, runs less than 20 feet.
   3. Types A-2, C-1, and M-1.
   4. Types A-3, C-1, C-2, and M-1.
   5. Types A-2, V-1, and V-3.
   6. Types V-1, V-2, V-3, and C-1.
   7. Types M-2 and C-3.

3.3 PREPARATION

A. Prepare and sequence the work to minimize disruption to each room environment and existing communications systems.

B. Protection: Cover all computers, electronic equipment, desks, chairs, furniture and other articles when working at ceiling level and/or performing dust producing tasks.

3.4 REPAIR AND RESTORATION

A. Where working in spaces occupied by the Owner, return to their original positions any furniture or articles relocated to perform the work.

3.5 CLEANING

A. Where working in spaces occupied by the Owner:
   1. Immediately after completing work within each space, clean up and remove all materials, scrap and dust.

2. All scrap material in work area shall be picked up and removed from the building at the end of each day. See also Section 01770 - Closeout Procedures for additional requirements.
3. All dust resulting from work performed shall be vacuumed up daily.
4. All scrap material shall be removed from site and disposed of in an authorized disposal site. Refer to Section 01565 - Site Waste Management Program.

END OF SECTION

SECTION 17026
GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Section includes grounding and bonding of Communications Work, including but not limited to:
   1. Communications Race
   2. Cable Runway
   3. Cable Shields
   4. Protector Fields
   5. Communications cabinets and enclosures.

1.2 RELATED WORK UNDER OTHER SECTIONS

A. Section 07840 - Firestopping
B. Section 16400 - Service and Distribution System
C. Section 17010 - Common Work Results for Communications
D. Section 17029 - Hangers and Supports for Communications Systems
E. Section 17033 - Conduits and Backboxes for Communications Systems
F. Section 17036 - Cable Trays for Communications Systems Communications Systems
G. Section 17100 - Structured Cabling, Basic Materials and Methods
H. Section 17116 - Communications Cabinets, Racks, Frames and Enclosures
I. Section 17119 - Communications Termination Blocks and Patch Panels
J. Section 17123 - Communications Cable Management
K. Section 17150 - Communications Horizontal Cabling

1.3 SYSTEM DESCRIPTION

A. Provide telecommunications system grounding conductor as described herein and indicate on drawings.
B. Except as otherwise indicated, the complete communications installation including the, metallic conduits and raceways, cable trays, boxes, cabinets and equipment shall be completely and effectively grounded in accordance with all code requirements, whether or not such connections are specifically shown or specified.
C. Resistance:
   1. Resistance from the farthest ground bus through the ground electrode to earth shall not exceed 5 Ohms or the requirements of ANSI-J-STD-607-A-2002, whichever is more restrictive.

1.4 REFERENCES

A. American National Standards Institute (ANSI)
   1. ANSI/TIAIEIA-606-A-2002 Administration Standard for Commercial Telecommunications Infrastructure
   2. ANSI-J-STD-607-A-2002 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
   3. Underwriters Laboratories (UL)
   4. UL 467 (1993); R 2004 Grounding and Bonding Equipment

1.5 SUBMITTALS

A. Conform with the requirements of Section 01300 - Administrative Requirements and Section 17010 Common Work Results for Communications.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Equal products by the following manufacturers will be considered providing that all features of the specified product are provided:
   1. Ground Rod:
      a. High strength high carbon steel, with electrolytically bonded jacket of copper on surface.
      b. UL spec. 467
      c. ANSI C-33.8-10n.
      d. Manufacturer:
         i. Allied Bolt
         ii. Inwesco 12A60
         iii. Blackburn
         iv. Cooper Power Systems
         v. Weaver.
         vi. Erico "Cadweld" Products, Inc.
         vii. ITT Blackburn.
         viii. Or equal.
   2. Ground Wells:
      a. Christy Concrete Products, Inc.
      b. Forni Corp.
      c. Or equal.
   3. Ground Bushings, Connectors, Jumpers and Bus:
      a. O-Z/Gedney.
      b. Thomas & Betts Corp.
      c. Or equal.
   4. Compression Connector Lug
      a. Panduit
      b. B-Line SB-479 Series
      c. Thomas & Betts
      d. Or equal.
   5. Telecommunications Ground Bus Bar
      a. CPI
      b. B-Line
      c. Panduit
      d. Or equal.
   6. Bonding Ribbon:
      a. Annealed solid copper 3/8 inch wide x 1/16 inch thick, tin plated.
      b. Manufacturer:
         i. Inwesco 12A55
         ii. Corning Cable Systems

iii. Preformed Line Products.
iv. Or equal.

7. Bonding Ribbon Clamp:
   a. Soft lead
   b. 1/16 inch thick
   c. Bolt hole for attachment
   d. Manufacturer:
      i. Inwesco 12A56
      ii. Corning Cable Systems
      iii. Preformed Line Products.
      iv. Or equal.
8. Fargo Clamp:
   a. Cast copper, silver plated, furnished with copper bolt.
   b. RUS Listed
   c. Manufacturer:
      i. Allied Bolt
      ii. Inwesco 12A57
      iii. Corning Cable Systems
      iv. or equal.
9. Ground Inserts:
   a. Cast Bronze w 1/4 Copper Rod.
   b. Provide minimum one each maintenance hole or vault.
   c. Manufacturer:
      i. Inwesco 12H69
      ii. Or equal by vault or manhole manufacturer.
      iii. Or equal.

2.2 GROUND CONDUCTORS

A. General purpose insulated: UL listed and code sized copper conductor, with dual rated THHN/THWN insulation, color identified green. Where continuous colorcoded conductors are not commercially available, provide a minimum 4" long color band with green, non-aging, plastic tape in accordance with NEC.

B. Bonding pigtails: Insulated copper conductor, identified green, sized per code, and provided with termination screw or lug. Provide solid conductors for #10 A WG or smaller and stranded conductors for #8 A WG or larger.

2.3 COMPRESSION CONNECTOR LUG

A. Description
   1. Connector lug with compression connection to conductor.
   2. Copper alloy body.
   3. Provide lug size to match conductor being terminated.
   4. Provide 2 hole pattern lugs.
   5. Provide each lug with silicon bronze hardware, including 2 bolts, 2 split lock washers and 2 nuts.

2.4 INSULATED GROUNDING BUSHINGS

A. Plated malleable iron or steel body with 150 degree Centigrade molded plastic insulating throat and lay-in grounding lug.

2.5 CONNECTIONS TO PIPE

A. For cable to pipe: UL listed bolted connection complying with CEC requirements.

2.6 CONNECTIONS TO STRUCTURAL STEEL, GROUND RODS, OR SPLICES

A. Where required by the Drawings or Specifications, grounding conductors shall be spliced together, connected to ground rods or connected to structural steel using exothermic welds or high pressure compression type connectors.
   1. Exothermic welds shall be used for cable-to-cable and cable-to-ground rod and for cable to structural steel surfaces. Exothermic weld kits shall be as manufactured by Cadweld, Thermoweld or equal. Each particular type of weld shall use a kit unique to that type of weld.
   2. High-pressure compression type connectors shall be used for cable-to-cable and cable-to-ground rod connections. Connections shall be as manufactured by Thomas & Betts #53000 series, Burndy "Hy-Ground" or equal.

2.7 EXTRA FLEXIBLE, FLAT BONDING JUMPERS

A. Where required by the drawing or specified herein.

PART 3 EXECUTION

3.1 GENERAL

A. Provide Grounding and Bonding according to the most restrictive requirements of:
   1. ANSI-J-STD-607-A.
   2. California Electrical Code Article 250 and references therein.
   3. California Electrical Code Article 800.

B. In the event of conflicting requirements, National Electrical Code requirements shall prevail.

C. Point of Connection
   1. Under Work of this Section, make connections to Communications Ground Busbars provided under Work of Section 16061 Grounding.
   2. Mechanical Connections

D. Make connections bare metal to bare metal.
   1. Where required, remove paint to bare metal, make grounding or bonding connection, and touch up paint.
   2. Torque threaded fasteners to manufacturer's recommended values.

E. Compression Connections
   1. Make compression connections with the lug or fitting manufacturer's recommended tooling, with the tooling set to the recommended force and stroke.

F. Communications Raceways and Sleeves
   1. Bond metallic raceway and sleeves to the Communications Ground Busbar at the Communications Room that serves the related Communications Receptacle.
   2. Where a metallic raceway connects 2 or more Communications Rooms, bond to the Communications Ground Busbar at each.

G. Cable Tray and Cable Runway

1. Coordinate with the Work of Section 17033 - Communications Raceways, Boxes and Fittings, paragraph Cable Runway.
2. Provide manufacturer's bonding clips, plates or jumpers as required to comply with the UL Classified conditions for use as an equipment grounding conductor.
3. Bond the Cable Runway to the Communications Ground Busbar at the Communications Room served.

H. Cable Shields
1. Comply with California Electrical Code Article 800.

I. Protector Fields
1. Comply with California Electrical Code Article 800.

J. Communications cabinets and enclosures
1. Bond to the Communications Ground Busbar at the Communications Room.

K. Emergency/Information Telephone enclosures
1. Bond as detailed on Communications Drawings.

L. Communications Broadband Systems
1. Comply with California Electrical Code Article 820.
2. Ground Broadband passives as shown on Communications Drawings.

3.2 LABELING

A. Provide labeling according to the requirements of:
1. ANSI/TIA/EIA-606-A.
2. Section 17053 Identification for Communications Systems.

END OF SECTION

SECTION 17029
HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SCOPE OF WORK:

A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the provision of communications supports and cable hook system as described in this specification, including but not limited to:
   1. Strut Supports
   2. Cable Hooks (J-Hooks)
   3. Beam Clamps
   4. Concrete Fasteners
   5. Touch-Up Materials
   6. Conduit Supports
   7. Equipment Supports
   8. Fastening Hardware

B. Related work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.
   1. Section 03300 - Cast-in-place Concrete. Concrete equipment pads.
   2. Division 5: Metals. Hangers for electrical equipment.
   3. Section 09260 - Gypsum Board Assemblies, Section 09510 - Acoustical Ceilings, Section 09512 - Manufactured Wood Ceilings, and Section 09520- Textile Ceiling System. Slack Fixture support wires.
   4. Section 17010 - Common Work Results for Communications
   5. Section 17026 - Grounding and Bonding for Communications Systems
   6. Section 17033 - Conduits and Backboxes for Communications Systems
   7. Section 17036 - Cable Trays for Communications Systems
   8. Section 17053 - Identification for Communications Systems
   9. Section 17100 - Structured Cabling, Basic Materials and Methods
   10. Section 17116 - Communications Cabinets, Racks, Frames and Enclosures
   11. Section 17123 - Communications Cable Management
   12. Section 17150 - Communications Horizontal Cabling

1.2 SYSTEM DESCRIPTION

A. Provide devices specified in this Section and related Sections for support of communications equipment specified for this Project.

B. Provide support systems that are adequate for the weight of equipment, conduit and wiring to be supported.

1.3 REFERENCES

A. American Society For Testing and Materials (ASTM)

1. ASTM AI23/AI23M-02 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM AI53/AI53M-04 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM B633-98el Specification for Electro-deposited Coatings of Zinc on Iron and Steel.
4. ASTM A653/A653M-04a Standard Specification for Steel Sheet, ZincCoated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the HotDip Process.

B. American National Standards Institute (ANSI)
1. ANSI/TIA/EIA-568-B.l-2001, Commercial Building Telecommunications Cabling Standard – Part l: General Requirement.
2. ANSI/TIA/EIA-568-B.2-2001, Commercial Building Telecommunications Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components.
3. ANSI/TIA/EIA-568-B.3;-2000, Optical Fiber Cabling Components Standard.
4. ANSI/ TIA/ EIA 569-B-2003, Commercial Building Standard for Telecommunications Pathways and Spaces.

C. National Fire Protection Association
1. NFPA 70, National Electrical Code

1.4 SUBMITTALS

A. Conform with the requirements of Section 01300 - Administrative Requirements and Section 17010 - Common Work Results for Communications.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new and unused, and of current manufacturer.

B. Cable hooks shall be listed and labeled by Underwriters Laboratories (UL) as required.

C. Cable hooks shall have the manufacturers name and part number stamped in the part itself for identification.

PART 2 PRODUCTS

2.1 SUPPORTING DEVICES

A. General
1. Supports to be sized to suit load and selected to match mounting conditions.

B. Manufacturers
2. Equal products by the following manufacturers will be considered providing that all features of the specified product are provided:
   a. Concrete fasteners:
      i. Phillips “Red-Head”
      ii. Remington
      iii. Ramset
      iv. Hilti
      v. Simpson Strong-Tie
      vi. Or Equal

b. Concrete inserts and construction channel:
   i. Unistrut Corp.
   ii. GS Metals "Globe Strut"
   iii. Thomas & Betts "Kindorf" Corp.
   iv. Or Equal
c. Conduit Straps:
   i. O-Z/Gedney
   ii. Erico "Caddy" Fastening Products
   iii. Thomas & Betts "Kindorf" Corp.
   iv. Or Equal
d. Beam Clamps
   i. Cooper B-Line
   ii. SuperStrut
   iii. Unistrut
   iv. Or Equal
e. Aircraft Cable Sway Braces
   i. Mason Industries
   ii. M.W. Sausse/Vibrex
   iii. Loos & Company, Inc.
   iv. Or Equal

C. Concrete Fasteners
   1. Provide expansion- type concrete anchors.
   2. Provide powder driven concrete fasteners with washers. Obtain approval from Owner's Representative prior to use.

D. Concrete Inserts
   1. Provide pressed galvanized steel, concrete spot insert, with oval slot capable of accepting square or rectangular support nuts of ¼ inch to ½ inch diameter thread for rod support.

E. Aircraft cable sway braces
   1. Steel rope sized to meet load.

F. Construction Channel
   1. Construction:
      a. 1-5/8" square galvanized channel formed from U.S.S.G No. 12 or 0.109 inch cold formed steel with 17/32-inch diameter bolt holes, and 1-1/2" on center in the base of the channel.
      b. 10 foot sections.
   2. All supporting materials by same manufacturer.

G. Beam Clamps
   1. Malleable iron electro-galvanized steel beam clamps selected to match building structural steel members.

H. Conduit Straps
   1. One hole strap, steel or malleable iron, with malleable iron clamp-back spacer for surface mounted wall and ceiling applications.
      a. Use malleable strap with spacers for exterior and wet locations.
      b. Use steel strap without spacers for interior locations.

2. Steel channel conduit strap for support from construction channel.
3. Steel conduit hanger for pendant support with threaded rod.
4. Steel wire conduit support strap for support from independent #12 gauge hanger wires.

I. Threaded rods, couplings, screws, and nuts:
1. Electrolytically coated with zinc, 2 oz. zinc per square foot of surface, ASTM A123 or A153.

J. Miscellaneous Parts
1. Hot dipped galvanized after fabrication; after cutting, de-burring and hole drilling. Coated with zinc, 2 oz. zinc per square foot of surface, ASTM Al23 or A153.

K. Paint/Tape for Touch-up:
1. Zinc: CRC "Zinc-It", Glyptal, Enterprise Galvanizing "Galambra", or equal.

2.2 CABLE HANGERS

A. Ceiling Hung J-Hooks
1. Drawing Reference(s):
   a. WMJ
   b. ACJ
2. Features/Functions/Construction
   a. Specifically intended to carry the load of up to 50 communications cables without applying excess forces to cables at bottom of bundle.
   b. Integral broad bottom edge to spread cable load with flat bottom and provide a minimum of 1-5/8” cable bearing surface.
   c. Integral hanger rod attachment hardware at top.
   d. Load rated for application.
   e. Incorporates smooth 90-degree radiused edges to prevent snagging cable jackets on installation.
   f. Designed so the mounting hardware is recessed to prevent cable damage.
   g. Integral mechanical cable latch retainer to provide containment of cables within the hook. The retainer shall be removable and reusable.
   h. Suitable for direct attachment to walls, hanger rods, beam flanges, purlins, strut, floor posts, etc. to meet job conditions.
   i. Multi-tiered cable hooks to be used where required to provide separate cabling compartments, or where additional capacity is needed.
   j. Finishes:
      i. Cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3.
      ii. Cable hooks for corrosive areas shall be stainless steel, AISI Type 304.
3. Manufacturer
   a. Cooper B-Line series BCH21, BCH32, BCH64

b. Erico/Caddy CableCat
c. Or Equal

PART 3 EXECUTION

3.1 GENERAL

A. The Owner's Representative reserves the right to request additional supports where in their sole opinion said supports are required. Any additional supports shall be installed at no additional cost to the Owner.

3.2 EXAMINATION

A. Thoroughly examine site conditions for acceptance of supporting device installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.3 PREPARATION

A. Coordinate size, shape and location of concrete pads required for equipment installation with Base Building General Contractor Coordinate size, shape and location of concrete pads required for equipment installation with Base Building General Contractor.
B. Layout support devices to maintain headroom, neat mechanical appearance and to support the equipment loads.
C. Where shown on the Drawings or Specifications, install freestanding communications equipment on concrete pads.

3.4 INSTALLATION

A. Furnish and install supporting devices as noted throughout the Communications Systems work.
B. Communications device and conduit supports shall be independent of all other system supports that are not structural elements of the building, unless otherwise noted.
C. Fasten hanger rods, conduit clamps, outlet and junction boxes to building structure using pre-cast inserts, expansion anchors, preset inserts or beam clamps.
D. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster or gypsum board partitions and walls.
E. Use expansion anchors or preset inserts in solid masonry walls.
F. Use self-drilling anchors, expansion anchor, or preset inserts on concrete surfaces.
G. Use sheet metal screws in sheet metal studs and wood screws in wood construction.
H. Do not fasten supports to piping, ductwork, mechanical equipment, conduit, or acoustical ceiling suspension wires.
I. Do not drill structural steel members unless first approved in writing by the Owner's Representative.
J. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
K. Install surface-mounted cabinets with minimum of four anchors. Provide additional support backing in stud walls prior to sheet rocking as required to adequately support cabinets and panels.

L. Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

3.5 ERECTION OF METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS "Structural Welding Code."

3.6 WOOD SUPPORTS

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

3.7 ANCHORAGE

A. As part of the equipment submittals, cot' all provide anchorage calculations for floor and wall mounted communications equipment so that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, Table 23P, Part II and with Section 2312 "Earthquake Regulations" of the "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Structural Calculations shall be prepared and signed by a California Registered Structural Engineer. Specify proof loads for drilled-in anchors, if used.

1. The contractor shall recommend the method of anchoring the equipment to the mounting surface and shall provide the Contractor with the assembly dimensions, weights and approximate centers of gravity.
2. All floor mounted, free standing electrical equipment such as racks and cabinets, etc. shall be securely fastened to the floor structure.

3.8 DISTRIBUTION PATHWAY VIA CEILING HUNG CABLE HOOKS (J-HOOKS):

A. Void, Plenum or Suspended Ceiling Exposed Cable Installation. Where drawings specifically show or permit use of exposed cable installation in voids, conform to the most restrictive requirements of Code TIA-569-B and this Section.

B. Provide support for all cabling. Do not place or attach direct grid, concealed spline grid, flexible or rigid ductwork, HVAC registers, sprinkler piping or fixtures, light fixtures or building structure. Conform to the California Electric Code.

C. Placement:

1. All pathways created by ceiling hung cable hooks shall be reviewed by The Owner’s Representative prior to installation.
2. Ceiling hung cable hooks and cabling supported by same shall not obscure access to access doors, hatches, air dampers, valves, filter sections, V A V boxes, cable trays, junction boxes, pull boxes or similar areas of access required by other trades.
3. All ceiling hung cable hooks shall be mounted close enough together such that upon completion of the station cable installation a minimum amount of cable droop occurs between adjacent rings. The distance between supporting rings shall not exceed 48” in wood frame construction, 60” in concrete construction, or as required by the current edition of TIA-569-B.
4. Refer to the separation requirements listed in Section 17150 - Communications Horizontal Cabling for minimum distances from electrical power and other electro-magnetic sources.

D. Follow manufacturer's recommendations for allowable fill capacity for each size of cable hook.
   1. Cable hooks shall be capable of supporting a minimum of 30 pounds with a safety factor of 3.
   2. Spring steel cable hooks shall be capable of supporting a minimum of 100 pounds with a safety factor of 3 where extra strength is required.
   3. Where aggregate cable bundle supported by ceiling hung cable hooks exceeds either the rated cable or weight load limit of the ceiling hung cable hook system, provide ceiling basket tray - Type CTW - as specified in Section 17036 Cable Trays for Communications Systems.

END OF SECTION

SECTION 17033
CONDUITS AND BACKBOXES FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SCOPE OF WORK:

A. Provide telecommunications pathways in accordance with EIA TIA/EIA-569-B, as specified in this Section and as shown on the plans. Provide system furniture pathways in accordance with UL 1286. Provision of all low voltage Communications Systems Pathway and Electronic Security and Safety System Pathway, including:
   1. Rigid steel conduit and fittings.
   2. PVC insulated rigid steel conduit and fittings
   3. Intermediate metal conduit and fittings
   4. Electrical metallic tubing and fittings.
   5. Flexible metallic conduit and fittings.
   6. Liquidtight flexible metallic conduit and fittings.
   7. Miscellaneous conduit fittings and products.
   8. Junction Boxes
   9. Floor Boxes
   10. Hinged cover enclosures.
   11. Pullboxes and Terminal Cabinets.

B. At Hazardous Occupancies, installation conforms to the requirements of California Electric Code for Class and Division rating of spaces.

1.2 RELATED WORK IN OTHER SECTIONS:

A. Related work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation
   1. Section 01730 - Cutting and Patching.
   2. Section 07600 - Flashing and Sheet Metal.
   3. Section 09900 - Paints and Coatings. Exposed conduit and other devices.
   4. Section 17010 - Common Work Results for Communications.
   5. Section 17026 - Grounding and Bonding for Communications Systems.
   6. Section 17029 - Hangers and Supports for Communications Systems.
   7. Section 17036 - Cable Trays for Communications Systems.
   8. Section 17100 - Structured Cabling, Basic Materials and Methods.
   9. Section 17150 - Communications Horizontal Cabling.

1.3 REFERENCES

A. Usage: In accordance with Section 01110 - Summary of Work.
   1. American National Standards Institute (ANSI).
      a. ANSI C80.l 1994 Rigid Steel Conduit - Zinc Coated.
      b. ANSI C80.3 1991 Electrical Metallic Tubing - Zinc Coated.
   2. National Electrical Manufacturers Association (NEMA).
      a. NEMA 250-2003 Enclosures for Electrical Equipment (1000 Volts Maximum).

b. NEMA FB 1 (ANSIINEMA FB 1-2003) Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
c. FB 2.10 2000 Selection and Installation Guidelines For Fittings For Use With Non-Flexible Metallic Conduit Or Tubing (Rigid Metal Conduit, Intermediate Metal Conduit, And Electrical Metallic Tubing).
d. FB 2.20 2000 Selection and Installation Guidelines for Fittings for use with Flexible Electrical Conduit and Cable.
e. NEMA ICS 6 1988 (Rev. 1) Enclosures for Industrial Control and Systems.
f. NEMA OS 3-2002 Selection and Installation Guidelines for Electrical Outlet Boxes.
g. NEMA RN 1-1998 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
h. NEMA TC 7 2000 Smooth Wall Coilable Polyethylene Electrical Plastic Duct.
i. NEMA TC 13 2000 Electrical Nonmetallic Tubing (ENT).
j. NEMA TC 14 1984(R 1986) Filament-Wound Reinforced Thermosetting Resin Conduit and Fittings.

3. Underwriters Laboratories, Inc. (UL).
a. UL 1 2000 Flexible Metal Conduit.
b. UL 6 2004 Electrical Rigid Metal Conduit – Steel.
c. UL 50 (1995; R 1999, Bul. 2001) Enclosures for Electrical Equipment.
d. UL 360 1986 (Bul. 1991) (R 1993) Liquid-Tight Flexible Steel Conduit.
e. UL 514A 1991 (R 2004) Metallic Outlet Boxes.
f. UL 514B 1989 (R 2004) Conduit, Tubing and Cable Fittings.
g. UL 514C 1996 (R 2000) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.
h. UL 651 1989 (R 1989) (Bul. 1993) Schedule 40 and 80 Rigid PVC Conduit.
i. UL 797 1993 (R 2004) Electrical Metallic Tubing – Steel.
j. UL 1242 1983 (R1993) (Bul. 1993) Intermediate Metal Conduit.
k. UL 1286(1999; R 2001, Bul. 2002) Office Furnishings.
l. UL 1479 Fire Tests of Through Penetration Firestops.
m. UL Fire Resistance Directories.

1.4 SUBMITTALS

A. Conform to the requirements of Section 01300 - Administrative Requirements and Section 17010 - Common Work Results for Communications.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new and unused, and of current manufacturer.
B. Only products and applications listed in this Section may be used on the project unless otherwise submitted and approved by the Owner's Representative.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide the following types of conduit systems listed by their commonly used generic name.

2.2 RACEWAY

A. Manufacturers:
   1. Raceway:
      a. Allied Tube and Conduit Co.
      b. Triangle PWC, Inc.
      c. Western Tube and Conduit Corp.
      d. Spring City Electrical Manufacturing Co.
      e. Occidental Coating Co. (OCAL).
      f. Alflex Corp.
      g. American Flexible Metal Conduit Co.
      h. Anaconda.
      i. Or equal.
   2. Fittings:
      a. Appleton Electric Co.
      b. OZ/Gedney.
      c. Thomas & Betts Corp.
      d. Spring City Electrical Manufacturing Co.
      e. Occidental Coating Co. (OCAL).
      f. Carlon.
      g. Or equal.

B. Rigid Steel Conduit.
   1. Drawing and Spec Reference: RSC.
   2. Construction:
      a. Conduit: Full weight, threaded, hot-dip galvanized steel, conforming to ANSI C80.1 and UL 6.
      b. Standard threaded couplings, locknuts, bushings, and elbows: Only materials of steel or malleable iron are acceptable. Locknuts shall be bonding type with sharp edges for digging into the metal wall of an enclosure.
      c. Three piece couplings: Electroplated, cast malleable iron.
      d. Insulating bushings: Threaded polypropylene or thermosetting phenolic rated 150 degree C minimum.
      e. Insulated grounding bushings: Threaded cast malleable iron body with insulated throat and steel "lay-in" ground lug with compression screw.

f. Insulated metallic bushings: Threaded cast malleable iron body with plastic insulated throat rated 150 degrees C.
g. All fittings and connectors shall be threaded.

C. Coated Rigid Steel Conduit:
1. Drawing and Spec Reference: CRSC.
2. Conduit: Full weight, threaded, hot-dip galvanized steel, conforming to ANSI C80.l and NEMA RN-l with nominal 40 mil thermoplastic vinyl coating, heat fused and bonded to the exterior of the conduit.
3. Fittings:
   a. Conduit couplings and connectors shall be as specified for galvanized rigid steel conduit and shall be factory PVC coated with an insulating jacket equivalent to that of the coated material.
   b. Fittings over-sleeve to extend 1 conduit diameter or 1-1/2" beyond fitting, whichever is less.
4. Performance:
   a. Tensile Strength: 3500 psi.
5. Approvals:
   a. NEMA RNI (Type 40 - 40 mils thick).
   b. CalTrans Type 2
6. Manufacturers:
   a. Plastibond by RobRoy Industries.
   b. Occal-40 by Occidental Coating Company.
   c. KorKap by Plastic Applicators.
   d. Ocal-Blue.
   e. Or equal.

D. Intermediate Metal Conduit.
1. Drawing Reference: IMC.
2. Conduit: Hot dip galvanized steel meeting the requirements of CEC Article 345 and conforming to ANSI C80.6 and UL 1242.
3. Fittings: Conduit couplings, connector and bushing shall be as specified for galvanized rigid steel conduit. Integral retractable type IMC couplings are also acceptable.

E. Electrical Metallic Tubing.
1. Drawing and Spec Reference: EMT.
2. Conduit: Shall be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam and hot dip galvanized after fabrication. Conduit shall conform to ANSI C80.3 specifications and shall meet UL classifications.
3. Set screw type couplings: Electroplated, steel or cast malleable iron, UL listed concrete tight. Use set screw type couplings with four setscrews each of conduit sizes over 2 inches. Setscrews shall be of case hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.

4. Set screw type connectors: Electroplated steel or cast malleable iron UL listed concrete tight with male hub and insulated plastic throat, 150 degree C temperature rated. Setscrew shall be same as for couplings.
5. Raintight couplings: Electroplate steel or cast malleable iron; UL listed raintight and concrete tight, using gland and ring compression type construction.
6. Raintight connectors: Electroplated steel or cast malleable iron, UL listed raintight and concrete tight, with insulated throat, using gland and ring compression type construction.

F. Flexible Conduit:
1. Drawing Reference: FLEX
2. Construction:
   a. Flexible steel, zinc coated on both inside and outside by hot-dipping process.
   b. Interlocking spirally wound continuous steel strip.
   c. 3/4" minimum size.
3. Fittings: Connectors shall be of the single screw clamp variety with steel or cast malleable iron bodies and threaded male hubs with insulated throats. Exception: Pressure cast screw-in connectors shall be acceptable for fixture connection in suspended ceilings and cut-in outlet boxes within existing furred walls.
4. Approvals:
   a. UL 1

G. Liquidtight Flexible Metallic Conduit:
1. Drawing Reference: Liquidtight
2. Conduit: Shall be fabricated in continuous lengths from galvanized steel strips, interlocking spirally wound, covered with extruded liquidtightjacket of polyvinyl chloride (PVC) and conforming to UL 360. Provide conduit with a continuous copper-bonding conductor wound spirally between the convolutions.
3. Fittings: Connector body and gland nut shall be of cadmium plated steel or cast malleable iron, with tapered, male, threaded hub; insulated throat and neoprene "0" ring gasket recessed into the face of the stop nut. The clamping gland shall be of molded nylon with an integral brass push-in ferrule.

2.3 MISCELLANEOUS CONDUIT FITTINGS AND PRODUCTS

A. General
1. UL 514B.
2. Listed in UL Electrical Construction Materials List.

B. Conduit Fittings, Insulated Throat Grounding Bushings
1. Description
   a. Threaded for Rigid Steel Conduit and Intermediate Metal Conduit.
   b. UL Listed for use with copper conductors.
   c. Thermoplastic insulated liner for 105 degrees Celsius.
   d. Body of malleable iron, zinc plated; or die cast zinc.
2. Manufacturer

a. Thomas & Betts (Steel City) BG-801 Series
b. O-Z/Gedney
c. Or equal.

C. Watertight conduit entrance seals: Steel or cast malleable iron bodies and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Fittings shall be supplied with neoprene sealing rings between the body and PVC sleeve.

D. Watertight cable sealing bushings: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel sealing screws and zinc plated cast malleable iron locking collar.

E. Expansion fittings: Multi-piece unit comprised of a hot dip galvanized malleable iron or steel body and outside pressure bussing designed to allow a maximum of 4" conduit movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. Unit shall be UL listed for wet or dry locations.

F. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve with internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling shall accommodate .75- inch deflection, expansion, or contraction in any direction, and allow 30-degree angular deflections. Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber jacket and stainless steel jacket clamps. Unit shall comply with UL467 and UL514.
1. Manufacturer:
a. OZ/Gedney Type DX
b. Steel City Type EDF
c. Or equal.

G. Fire rated penetration seals:
1. UL classified.
2. Conduit penetrations in fire rated separation shall be sealed with a UL classified assembly consisting of fill, void or cavity materials.
3. The fire rated sealant material shall be the product best suited for each type of penetration, and may be a caulk, putty, composite sheet or wrap/strip.
4. Penetrations of rated floors shall be sealed with an assembly having both F and T ratings at least equal to rating of the floor.
5. Penetrations of rated walls shall be sealed with an assembly having an F rating at least equal to the rating of the wall.

H. Standard products not herein specified:
1. Submit for review a listing of standard electrical conduit hardware and fittings not herein specified prior to use or installation, i.e. locknuts, bushings, etc.
2. Listing shall include manufacturers name, part numbers, and a written description of the item indicating type of material and construction.
3. Miscellaneous components shall be equal in quality, material, and construction to similar items herein specified.

I. Hazardous area fittings: UL listed for the application.

2.4 JUNCTION AND DEVICE BOXES

A. Junction and Device Boxes

1. Drawing References: As shown on Symbol Schedule
2. Construction:
   a. Concealed/Flush Mounted:
   b. One or two piece welded knockout boxes.
   c. UL 514A, cadmium or zinc-coated 1.25 oz/sq. ft., if ferrous metal.
   d. Pressed sheet steel, for indoor locations.
   e. UL 514C approved if non-metallic.
   f. At hollow masonry, tile walls and plaster walls, provide with device rings as required.
   g. Surface mounted:
      i. Exterior – Conform to the Junction and/or PullBox construction scheduled on the Plans. Where construction not otherwise scheduled or noted on the plans, conform to the following:
         (1) Cast iron or aluminum with threaded hubs and mounting lugs.
         (2) Gasketed cover with spring lid.
      ii. Concrete floor embedded:
         (1) Cast iron concrete pour boxes with screwed brass cover, unless otherwise noted.
         (2) Cadmium plated screw cover attachment at least 6" on center.
   h. If size not otherwise noted, at least 4S (4" square) by 2-1/8" deep, or Code minimum size, whichever is larger.
      i. Wherever 4S is indicated, contractor may at their option substitute 4-11/16" square boxes while maintaining the minimum depth required by these specifications and the drawings.
   i. Provide complete with approved type of connectors and required accessories, including attachment lugs or hangers. Provide raised device covers as required to accept scheduled device.
3. Approvals.
   a. UL 514A
4. Manufacturers:
   a. Interior:
      i. Steel City.
      ii. Bowers.
      iii. Or equal.
   b. Exterior, exposed with cover of same construction.
      i. Appleton
      ii. Pyle-National
      iii. Or equal.
   c. Other conditions:
      i. Any meeting approvals and requirements.

B. Locking Wall Boxes

2. Drawing References: L WB3, L WB4.
3. Features/Functions/Construction.
    a. Locking hinged steel cover.
    b. Accepts 3 or 4 gang plate inserts.
    c. 2-1/8" minimum depth behind plate insert.
    d. Protects contents from tampering when closed.
    e. Lid incorporates push-to-open retention latch.
    f. Lid folds down 180 degrees, out of way during use.
    g. Size.
        i. LWB3: NEMA 3 gang capacity.
        ii. LWB4: NEMA 4 gang capacity.
    h. Finish:
        i. Submit White or Prime options for selection by the Architect.
4. Manufacturers
    a. FSR Inc.
        i. LWB3: WB-3G with 3 gang Bowers backbox.
        ii. L WB4: WB-4G with 4 gang Bowers backbox.
    b. Custom by C.W. Cole.
    c. Or equal.

2.5 CABINETS AND ENCLOSURES

A. Terminal Cabinets.
1. Drawing Reference: As Scheduled.
2. Construction:
    a. Zinc Coated Sheet Steel, code gauge with standard concentric knockouts for conduit terminations.
    b. Interior dimensions not less than those scheduled.
    c. Finish: Manufacturer's standard gray baked enamel finish.
    d. Covers: Trim fitted, continuous hinged steel door, flush catch-lockable and keyed to match. Screw fastened doors not acceptable.
        i. Door face to be not less than 95% of panel interior dimensions.
    e. Provide with 3/4" fire retardant treated ply backboard.
3. Mounting:
    a. Flush cabinets shall be furnished with concealed trim clamps and shall be not less than 4 inches deep.
    b. Surface cabinets shall be furnished with screw cover trim, flush hinged door and shall not be less than 6 inches deep.
    c. Interior Applications:
        i. NEMA 250 Type 1, unless otherwise noted. Refer to plans and schedules.
    d. Exterior Applications:
        i. NEMA 250 Type - As Scheduled, not less than NEMA 3R.
4. Manufacturers:
    a. B-Line Electrical Enclosures.

b. Circle AW Products.
c. Hammond.
d. Henessey.
e. Hoffman.
f. Myers Electric Products.
g. Rittal.
h. Or equal.

2.6 FLOOR BOXES, POKE-THROUGHS AND MONUMENTS

A. Floor Box High Capacity, 3 Compartment
  A. Plan Reference: FC4, FW4, FR4
  2. Features
    a. UL Listed
    b. Box
      i. Size at least 10 inches by 12 inches by 6 inches deep.
      ii. Three compartments, with voltage barriers, with standard electrical plate mounting brackets for at least:
        (1) One single gang.
        (2) One 2 gang.
        (3) One 4 gang.
    c. Knockouts concentric, combination 1 inch and 1.25 inch.
    d. Cover for carpet finish.
    e. Cover size approximately 10.5 inches by 12.5 inches.
    f. At least 11 gage steel.
    g. Carpet flange of mitered brass or aluminum edging.
      i. Option of brass or aluminum to be selected by the Architect.
      ii. Option of 0.25 inch or 0.5 inch flange height to be selected by the Contracting Officer.
    h. Within cover, provide a lift-off, full-access door, open area approximately 6.5 inches by 8 inches.
    i. Within the lift-off, full-access door, provide a hinged, fold-back cable exit port.
    j. Open area approximately 2 inches by 2 inches.
    k. Flush in closed position.
  3. Applications:
    a. FC4: Concrete floor systems. Provide "pour pan" protection at slab on grade conditions.
    b. FR4: Raised Floor Conditions.
    c. FW4: Wooden Floor Conditions.
  4. Approvals:
    a. UL 514A scrub water.
  5. Manufacturers:
    a. FSR Inc.
      i. FC4: FL-500P-(cover flange code)-4. Supply larger boxes where scheduled and indicated plates and jacks require it.

Provide manufacturer's "Pour Pan" FL-GRD2 or FL-GRD4 to protect from moisture at installations at grade level.

ii. FW4, FR4: FL-540P-(cover flange code)-4. Supply larger boxes where scheduled and indicated plates and jacks require it.

b. RCI Systems, Inc.

i. FC4: FB-2600. Supply larger boxes where scheduled and indicated plates and jacks require it. Provide manufacturer's "Pour Pan" to protect from moisture at installations at grade level.

c. Wiremold/Walker RFB-ll.

d. Or equal.

B. Electrified Furniture Monuments.

1. Plan Reference: EFM
2. Construction:
   a. Above slab box construction.
      i. Die-cast aluminum with satin finish.
      ii. Four-piece assembly consisting of base plate, three-sided housing, and removable faceplates.
      iii. Equipped with faceplate that accepts modular jacks specified in Section 17150.
   b. Manufacturers:
      i. Wiremold 525RT
      ii. Or equal.

2.7 TABLETOP BOXES

A. Presenter Desk Network Interface.

1. Drawing Reference: PDN.
2. Construction/Features/Function.
   a. Steel Enclosure with flip-up lid - refer to detail on plans.
   b. Installs flush in Presenter Desktop or Conference Table.
3. Approvals
   a. UL Spill Rating
4. Accommodates Keystone standard network jack.
5. Convenience power receptacle.
6. Manufacturer:
   a. Mockett PCSS.
   b. Wiremold.
   c. Or equal.

PART 3 EXECUTION

3.1 CONDUIT APPLICATION

A. General: Install the following types of conduits and fittings in the locations listed, unless otherwise noted in the drawings:

1. Exterior, Exposed:

a. Type RSC for applications up to 8 feet AFF or to first pull box, whichever is first, applications subject to physical abuse or for applications greater than 4" diameter.
b. EMT acceptable in all other applications not noted above up to 4", where used in conjunction with specified Raintight (compression) couplers.

2. Interior, Exposed, Wet and Damp Locations:
   a. Type RSC.
   b. At interior locations over 8 feet above finished floor, EMT acceptable.
3. Interior, Hazardous Locations.
   a. Type RSC
   b. Type IMC, where permitted by the CEC.
4. Interior, exposed or concealed, dry locations:
   a. RSC, if subject to physical abuse.
   b. EMT, if not subject to physical abuse.
5. Interior, concealed, damp locations, including in masonry walls.
   a. RSC
6. Embedded in Concrete.
   a. RSC or rigid non-metallic conduit.
   b. PVC Type DB-120.
7. Transition from walls to open plan furniture systems:
   a. Liquidtight.

3.2 GENERAL REQUIREMENTS

A. Refer to the manufacturer's instructions and conform thereto.
B. Distribution Pathway via EMT Raceway:
   1. The EMT conduit is to be installed meeting the NEC handbook Article 348 Installation Specifications.
   2. Provide escutcheon plates for all through wall conduit stubs.
   3. All ends of conduits shall be cut square, reamed and fitted with insulated bushing.
   4. All conduit which passes through fire walls shall be sealed with fire stop putty after all station wire has been installed.

3.3 MOUNTING AND INSTALLATION – DEVICE BOXES

A. Conform to the more restrictive of NEMA OS 3-2002 and the following.
B. Provide backboxes at all communications systems devices. Installation of device plates directly to wall surface without use of a backbox, unless specifically directed on plans, is unacceptable.
C. The distance between pull boxes shall not exceed 150 feet or more than two 90 degree bends.
D. Align boxes plumb with floor and surrounding construction. At door frames, locate 4" from frame. Verify placement with Owner's Representative details to ensure that box clears all trim, etc.
E. Support and fasten boxes securely. At stud walls use rigid bar hangers, attached to hanger with stud and nut.

F. At existing locations, provide cutting, patching and finishing as required to maintain or restore finishes so that resulting installation is integrated into the Architectural decor of the particular location.
G. Mounting Height: the mounting height of a wall-mounted outlet box is defined as the height from the finished floor to the horizontal center line of the cover plate.
H. Mount outlet boxes with the long axis vertical. Three or more gang boxes shall be mounted with the long axis horizontal.
I. Install wiring jacks and outlet devices only in boxes which are clean; free from excess building materials, dirt, and debris.
J. Install wiring jacks and outlet devices after wiring work is complete.

3.4 TERMINAL CABINETS, JUNCTION BOXES AND PULL BOXES

A. General
   1. Thoroughly examine site conditions for acceptance of cabinets and enclosures installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.
B. Set cabinets and enclosures plumb and symmetrical with building lines. Furnish and install all construction channel bolts, angles, etc. required to mount all equipment.
C. Cabinets and enclosures shall be anchored and braced to withstand seismic forces calculated in accordance with standards referenced in Section 17029.
D. "Train" interior wiring, bundle and clamp using specified plastic wire wraps. Separate power and signal wiring.
E. Replace doors or trim exhibiting dents, bends, warps or poor fit that may impede ready access, security or integrity.
F. Terminate conduit in cabinet with lock nut and grounding bushing.
G. Cleaning
   1. Touch-up paint any marks, blemishes or other finish damage suffered during installation.
   2. Vacuum clean cabinet on completion of installation.

3.5 SUPPORT

A. Provide supports for raceways as specified in Section 17029 - Hangers and Supports for Communications Systems.
B. All raceways installed in exposed dry locations shall be grouped in a like arrangement and supported by means of conduit straps, wall brackets or trapeze hangers in accordance with Code and the requirements of the this Section and Section 17029 - Hangers and Supports for Communications Systems. Fasten all hangers from the building structural system.
C. Provide supports and mounting attachments per the most restrictive of Code and the following.

Raceway Size (inches)	No of cables in run	Location	Support Spacing (feet)	
			RSC	EMT
Horizontal Runs				
1/2, 3/4	1-2	Flat Ceiling Wall Runs	5	5
1/2, 3/4	1-2	Where access limited to building	7	7

		structure		
1/2, 3/4	3≥	Any location	7	7
1≥	1-2	Flat ceiling or wall	6	6
1≥	1-2	Where access limited to building structure	10	10
1≥	3≥	Any locations	10	10
Any	Any	Concealed	10	10
Vertical Runs				
1/2, 3/4	Any	Exposed	7	7
1, 1-1/4	Any	Exposed	8	8
1-1/2 ≥	Any	Exposed	10	10

D. Install no more than one coupling or device between supports.

E. Conduit support.

1. As specified in Section 17029 - Hangers and Supports for Communications Systems.

F. The Owner's Representative reserves the right to request additional supports where in their sole opinion said supports are required. Any additional supports shall be installed at no additional cost to the Owner.

3.6 PENETRATIONS

A. Gypsum Wall Board Penetrations: Provide circular penetrations maximum 1/8" inch larger than outer diameter of conduit being used. On both sides of the wall fill space between conduit and wall with joint compound, depth to match gypsum board thickness.

B. Install UL listed fire-stop system whenever a raceway penetrates a firewall in conformance with the manufacturer's directions, the published systems assembly requirements, CBC Section 709 and 710 and CEC 300-21, whichever is the most restrictive. At cable tray penetrations, provide pillow type removable fire stop per CBC Section 709 and 710, the published systems assembly requirements and the manufacturer's directions, whichever is the most restrictive.

C. All communications systems conduit openings in walls and floors are the responsibility of the Contractor. Install sleeves shown on the drawings when the concrete is poured. Any openings required after the concrete has set maybe core drilled.

3.7 RACEWAY INSTALLATION, GENERAL

A. Raceway runs are shown schematically. Install concealed unless specifically shown otherwise. Supports, pull boxes, junction boxes and similar generally not indicated. Provide where designated.

1. Install exposed conduit and raceway parallel and perpendicular to nearby surfaces or exposed structural members, and follow the surface contours. Level and square conduit and raceway runs.

2. Raceway runs shall be mechanically and electrically continuous between all each equipment rack and utility demarcation point, receptacle and/or surface raceway strip, as applies.
3. Each conduit shall enter and be securely connected to a cabinet, junction box, pull box, or outlet by means of a locknut on the outside and a bushing on the inside or by means of a liquid-tight, threaded, self-locking, cold-weld type wedge adapter.
4. Bends.
   a. All bends or elbows shall have a minimum radius as follows:

Conduit Size	Min. Radius (Inches)
¾”	8
1”	12
1-1/4”	18
2”	24
2-1/2”	24
3”	30
3-1/2”	30
4”	30
5”	36
6”	42

   b. Use factory elbows or machine bends for conduit bends 1-1/4" and larger.
5. Make bends and offsets so the inside diameter is not effectively reduced. Make bends in parallel or banked runs from the same center line so that the bends are parallel.
6. Install at least one (1) 3/8", 200 pound strength nylon pull cord in all empty raceways.
7. Raceways crossing building expansion joints or in straight runs exceeding 1 00 feet shall be provided with UL listed expansion fittings.
8. Install conduit seals and drains to prevent accumulated moisture in conduits from entering Communications System enclosures.

B. Do not install conduit in concrete slabs unless specifically directed by Owner's Representative. Embedded conduits in concrete slab walls, and columns shall be installed in center third between upper and lower layers of reinforcing steel as directed by the Owner's Representative. Space conduits 8" on center except at cabinet locations where slab thickness shall be increased as directed by the Owner's Representative.

C. All conduits to be kept 12" away from steam or hot water lines. Install horizontal conduit and raceway runs below water and steam piping.

D. Conduit dropping down to equipment shall be as straight as possible without any offsets, parallel or perpendicular to walls, ceilings and other building features.

E. Conduit installed on any equipment shall be run symmetrical with the equipment and in such a manner as to:
   1. not to be exposed to damage;

2. not interfere with access to components of the equipment that will interfere with maintenance operation or;
3. not to be in a manner that the Owner deems detrimental to its operation.

F. Whenever an installation such as that listed occurs, the Contractor shall make all necessary changes at no additional cost to the Owner.

G. All cut ends of conduit, scratches, tool marks, etc. on any metallic raceway installed in the ground or on the exterior of the building shall be treated with two coats of specified Touch Up Paint/Tape.

H. Exposed conduit and metallic surface raceway installed in finished spaces shall be painted to match surrounding surfaces using paint and methods directed by the Owner's Representative.

I. All raceways stubbing up into equipment or racks shall be sealed. Raceways with conductors shall be plugged with duct-seal. Spare raceways shall be capped. Prevent foreign matter from entering conduit and raceway; use temporary closure protection. Replace conduits containing concrete, varnish or other foreign material.

J. Complete installation of conduit and raceway runs before starting installation of cables/wires within conduit and raceway.

K. Use specified conduit and raceway fittings that are of types compatible with the associated conduit and raceway and suitable for the use and location. Join and terminate conduit and raceway with fittings designed and approved for the purpose of the conduit and raceway system and make up tight.

L. Where chase nipples are used, align the raceway and coupling square to the box and tighten the chase nipple so no threads are exposed.

M. Horizontal conduit or EMT runs, where required and permitted, shall be installed as close to ceiling or ceiling beams as practical.

N. Conduit and EMT connected to wall outlets shall be run in such a manner that they will not cross water, steam or waste pipes or radiator branches.

O. Conduit and EMT shall not be run through beams, purlins or columns except where permission is granted by Owner's Representative in writing.

P. Bond installed metallic raceway in accordance with the requirements of the CEC.

3.8 RACEWAY FOR ACCESS CONTROL AND INTRUSION DETECTION SYSTEMS

A. Refer to general requirements herein above.

B. Access control and intrusion detection systems shall be installed in entirely in raceway, including:
   1. Rough- in for the field devices as detailed and scheduled on the plans.
   2. Pull cabinets located at regular intervals in the building, sized to accommodate the access control and intrusion detection cabling.
      a. Size raceway between pull cabinets to accommodate fill of field devices.
      b. Provide two separate raceway systems.
         i. one for power cabling, including power for door locks and field devices.

ii. one for Access Control and Intrusion Detection System field devices, including card readers, motion detectors, glass break sensors, request-to-exit sensors and similar.
(1) For Owner's Security contractor provided card readers, assume a 0.26 inch diameter cable is required from the serving IDF or BD to each door scheduled to receive a card reader.

3. Gutter at backboard of BD and IDF to terminate the raceway arriving from the pull cabinets and directly from the field devices.
4. Terminal cabinets at backboard of BD and IDF to enclose the TB15's used to terminate the field wiring installed under the work of this contract.

3.9 HAZARDOUS LOCATIONS

A. Use rigid steel conduit only.
B. Install UL listed sealing fittings that prevent passage of explosive vapors in accordance with the manufacturers written instructions. Locate fittings at suitable, accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank coverplate having a finish similar to that of adjacent plates or surfaces.
C. Install raceway sealing fittings at the following points and elsewhere as indicated:
1. Where conduits enter or leave hazardous locations.

3.10 REUSE OF EXISTING CONDUIT

A. Existing conduit is to be used as a pathway only where so shown on the drawings.
B. Prior to beginning work involving the use of an existing conduit, the Contractor shall consult with the Owner's Representative in order to establish whether or not the conduit contains active service.
C. If no active service exists within the conduit, all cable is to be removed, and work is to proceed.
D. If active service does exist within the conduit and it has been determined that service needs to be disrupted, then work on that conduit shall not proceed until a schedule of service outage has been established by Owner's Representative. Once given permission to proceed, the Contractor shall within the time period of one (l) working day; remove the old cable, install, terminate and test the new cables, and notify the Owner's Representative the work using the specific conduit has been completed.
E. Conduit preparation procedure:
1. Remove existing Wires and Cables (if any).
2. Run a mandrel Y2" smaller than the inside diameter of the conduit through the conduit receiving new wires and cables.
3. If the specified size mandrel will not pass through the existing conduit, start with a smaller size mandrel and increase mandrel size until the specified sized mandrel will pass.
4. Run a wire brush and clean rag with an outside diameter 1/8" larger than the inside of the conduit through the conduit receiving new wires and cables.
5. Repeat above until conduit is clean and materials detrimental to the wire and cables to be installed no longer exit conduit with the clean rag.

3.11 STATION CABLE PATHWAY INSTALLATION

A. Cut In Boxes and Station Outlet Boxes.
   1. Unless otherwise noted on the plans, all cut in boxes and surface station outlet boxes are to be installed at a height of 36" A.F.F. (above finished floor) to center, except for those intended to be used for telephone wall jacks. Those plates or boxes that are to be used for telephone wall jacks shall be installed at a height of 54" A.F.F. to center.
   2. All station outlets shall be installed so that their edges are parallel to the vertical and horizontal edges of the surface on which they are mounted.

END OF SECTION

SECTION 17036
CABLE TRAYS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SCOPE OF WORK:
A. Cable Trays for Communications Cabling.
   1. Cable Trays
   2. Cable Runways
   3. Basket Tray

B. Cable Tray Support

1.2 RELATED WORK UNDER OTHER SECTIONS:
A. Section 17010 - Common Work Results for Communications.
B. Section 17026 - Grounding and Bonding for Communications Systems.
C. Section 17029 - Hangers and Supports for Communications Systems.
D. Section 17033 - Conduits and Backboxes for Communications Systems.
E. Section 17053 - Identification for Communications Systems.
F. Section 17100 - Structured Cabling, Basic Materials and Methods.
G. Section 17150 - Communications Horizontal Cabling.

1.3 REFERENCES
A. Usage: In accordance with Section 01110 - Summary of Work.
   1. National Electrical Manufacturers Association (NEMA).
      a. NEMA FG 1 1-1998 Fiberglass Cable Tray Systems.
      b. NEMA VE 1 1-1998 Metal Cable Tray Systems.
      c. NEMA VE 2 2001 Metal Cable Tray Installation Guidelines.

1.4 SUBMITTALS
A. Conform with the requirements of Section 01300 - Administrative Requirements and Section 17010 Common Work Results for Communications.

1.5 DELIVERY, STORAGE AND HANDLING
A. Procedures: In accordance with Section 01600 - Product Requirements.

1.6 SEQUENCING
A. Not Used.

PART 2 PRODUCTS

2.1 CABLE TRAY, CABLE RUNWAY AND BASKET TRAY
A. Cable Tray
   1. Drawing and spec reference: CTxx-yy, where "xx" denotes nominal width of cable runway in inches and "yy" denotes nominal depth.
   2. Construction:
      a. Steel or aluminum.
      b. Rungs 9" on center, unless otherwise noted.
      c. UL Classified splice kits.
   3. Approvals:

a. ASTMA513.
b. California Electrical Code, Article 318.
c. NEMA VEl Class 12C minimum, or to suit indicated cable and raceway loads, whichever is greater.

4. Manufacturers:
a. B-Line Cable Tray Systems Ladder Type Cable Tray.
b. Globe Tray.
c. PW Industries.
d. Or equal.

B. Cable Runway
1. Drawing and spec reference: CR*, where "*" denotes nominal width of cable runway in inches.
2. Construction:
a. Solid Steel Side Bar per ASTM A-36 or Tubular Steel Side Bar per ASTM A-513.
b. 1.5" x 0.375 minimum tubular side stringers.
c. UL Classified splice kits.
d. Designed to support at least 100 pounds per foot load with a Safe Working Load deflection of ½" or less.
3. Finish: Telco gray powder coat or gold on zinc plating.
4. Approvals:
a. ASTM A513
b. UL Classified as an equipment grounding conductor.
c. California Electrical Code, Article 318
5. Manufacturers:
a. B-Line Telecom-Saunders SB-17.
b. Chatsworth Products Inc. 11275 series.
c. PW Industries.
d. Or equal.

C. Cable Tray, Open Wire Frame
1. Drawing and spec reference(s): CTWxx-y, where xx denotes the tray width and y the depth of the tray, in inches.
2. Construction.
a. Welded wire mesh with continuous safety edge wire lip.
b. Mesh forms grid at nominally 2" by 4".
c. Carbon Steel.
d. Electroplated zinc galvanized.
e. All bends, seams and joints field fabricated from basic straight section pieces and splice components as supplied by the manufacturer.
f. Where supported from ceiling, supported at both sides in trapeze arrangement - centerline support not acceptable.
g. Provides pathway complying with EIA/TIA-569B and NEMA Publications VEl & VE2.
h. Meets requirements of California Electrical Code, Article 318.

3. Approvals:
   a. NEMA Publications VEl & VE2.
4. Manufacturers:
   a. B-Line Wire Basket Runway.
   b. Cablofil.
   c. G.S. Metals Corp.
   d. Or equal.

D. Cable Tray, Fiberglass
1. Drawing and spec reference(s): CTFxx-y, where xx denotes the tray width and y the depth of the tray, in inches.
2. Construction
   a. Non-metallic, Non-conductive, Fiberglass Construction, suitable for continuous exterior exposure in a marine environment.
   b. Deep structural C-form side channels.
   c. Ladder rungs at 9" O.C., UON
   d. All bends, seams and joints field fabricated from basic straight section pieces and splice components as supplied by the manufacturer.
3. Approvals:
   a. UL Listed as a system.
   b. ASTMA568.
   c. NEMA Publication FGl.
   d. NEMA 12C.
   e. California Electrical Code, Article 318.3.
   f. Meets ASTM E-84 smoke density rating; Polyester 680, Vinyl Ester 1025.
   g. Class 1 Flame Rating and self-extinguishing requirements of ASTM D-635.
4. Manufacturers:
   a. Enduro Composite Systems.
   b. Robroy.
   c. PW Industries.
   d. Or equal.

PART 3 EXECUTION

3.1 Cable Tray Application

A. Unless otherwise noted, communications cable tray installations shall conform to the following:
1. Type CT - Within Communications Rooms (including Telecomm Building (ADF), BDF and IDF spaces).
2. Type CTW - Horizontal station cabling outside of the communications rooms where shown on plans or where more than 100 cables are supported, whichever is greater.

3. Type CR - Wherever vertical transitions from ceiling or floor sleeves are required within the Communications Room.

3.2 Installation:

A. Provide all required supports, fittings and accessories for a complete system as described in NEMA VE-2, by Code, manufacturer recommendation or as shown on the plans, whichever is most restrictive.

B. Bond sections to one another and to building ground.

C. Access Clearance. Maintain access for use by Owner's personnel to tray as described below. Coordinate installation with work of structural, mechanical, plumbing/fire protection and electrical trades to maintain required access.

1. Unless shown otherwise on the plans, provide a clear access of at least 24" wide along one side of each tray for use by Owner's personnel.
2. Unless shown otherwise on the plans, installation to maintain at least 12" vertical clearance over the top of each tray for use by Owner's personnel.

3.3 Support

A. Support in accordance with the most restrictive of the following:

1. Contractor's engineered means of engineered support submitted in accordance with the requirements of 17010 - Common Work Results for Communications and Section 17029 - Hangers and Supports for Communications Systems.
2. California Building Code, including but not limited to requirements of Volume 2, Chapter 16, Division *N,* Section 1632 and Table 16-0.
3. Metallic Cable Tray: NEMA VE 2-2001, or latest edition.
4. Fiberglass Cable Tray: NEMA FG-I-1998, or latest edition.

B. Provide lateral sway bracing as required by Code.

END OF SECTION

SECTION 17053
IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY:

A. Provide all labor, materials, tools, and equipment required for permanent intelligible labeling on, or adjacent to, all cabling, connectors, innerduct, faceplates, jacks, receptacles, controls, fuses, circuit breakers, patching jacks, and racks.

B. This section includes minimum requirements for the following:
   1. Labeling Communications Cabling
   2. Labeling Closet Hardware
   3. Labeling Work Stations
   4. Labeling Pathways, Spaces, Grounding and Bonding.

C. Refer to detailed plans for additional requirements.

D. Clearly and distinctly indicate the function of the item.

E. Coordinate with Record Drawings

1.2 REFERENCES:

A. Usage: In accordance with Section 01110 – Summary of Work.

B. American Society for Testing and Materials (ASTM)
   1. ASTM D 709(2001) Laminated Thermosetting Materials

C. Electronic Industries Alliance (EIA)
   1. EIA TIA/EIA-606-A(2002) Administration Standard for Commercial Telecommunications Infrastructure (ANSI/TIA/EIA-606)

D. Underwriters Laboratories (UL)
   1. UL 969 (1995: R 2001) Marking and Labeling Systems

1.3 QUALITY ASSURANCE

A. Identification and administration work specified herein shall comply with the applicable requirements of:
   1. ANSI/TIA/EIA-606-A Administration Standards.
   2. ANSI/TIA/EIA-569B Pathway and Spaces
   3. ANSI/TIA/EIA-568B Telecommunications Cabling Standard
   4. BICSI Telecommunications Distribution Methods Manual
   5. UL 969 (1995; R 2001) Marking and Labeling Systems.

1.4 SUBMITTALS

A. Conform with the requirements of Section 01300 – Administrative Requirements and Section 17010 – Common Work Results for Communications.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Procedures: In accordance with Section 01600 – Product Requirements.

1.6 SEQUENCING

A. Not Used.

PART 2 PRODUCTS

2.1 COMMUNICATIONS CABLING LABELS, INTERIOR

A. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.

B. Shall be preprinted or computer printed type. Handwritten labels are not acceptable.

C. Provide vinyl substrate with a white printing area and black print. If cable jackets are white, provide cable label with printing area that is any other color than white, preferably orange or yellow – so that the labels are easily distinguishable.

D. Shall be flexible vinyl or other substrates to apply easy and flex as cables are bent.

E. Shall use aggressive adhesives that stay attached even to the most difficult to adhere to jacketing.

F. Manufacturers:

1. Cable Type – Silver Satin
   a. Brady TLS2200 labels – PTL-31-427
   b. Brady laser printable labels – LAT-18-361, LAT-53-361
   c. Or equal.
2. Cable Type – 4 pair UTP
   a. Brady TLS2200 labels – PTL-31-427
   b. Brady laser printable labels – LAT-18-361, LAT-53-361
   c. Or equal.
3. Cable Type – 4 Pair STP
   a. Brady TLS2200 labels – PTL-21-427
   b. Brady laser printable labels – LAT-19-361
   c. Or equal.
4. Cable Type – 25 pair copper
   a. Brady TLS2200 labels – PTL-21-427
   b. Brady laser printable labels – LAT-19-361
   c. Or equal.
5. Cable Type – 50 pair copper
   a. Brady TLS200 labels – PTL-33-427
   b. Or equal.
6. Cable Type – 100 pair copper
   a. Brady TLS2200 labels – PTL-34-427
   b. Or equal.
7. Cable Type – 6-12 strand fiber
   a. Brady TLS2200 labels – PTL-21-427
   b. Or equal.
8. Cable Type – RG-6 Coax
   a. Brady TLS2200 labels – PTL-31-427, PTL-32-427
   b. Brady laser printable labels – LAT-18-361, LAT-53-361
   c. Or equal.
9. Cable Type – RG-59 Coax
   a. Brady TLS2200 labels – PTL-31-427, PTL-32-427
   b. Brady laser printable labels – LAT-18-361, LAT-53-361

10. Cable Bundles
    a. Brady TLS2200 labels – PTL-12-109
    b. Or equal.

2.2 COMMUNICATIONS CABLE LABELS, OUTSIDE PLANT

A. Cable Tags in Manholes, Handholes, and Vaults
   1. Provide tags for communications cable or wire located in manholes, handholes, and vaults.
      a. The tags shall be polyethylene.
      b. The tags shall be machine printed – handwritten tags are not acceptable.
   2. Polyethylene Cable Tags
      a. Provide tags of polyethylene that have an average tensile strength of 3250 pounds per square inch; and that are .08 inch thick (minimum), non-corrosive, non-conductive, resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 170 degrees F.
      b. Provide .05 inch (minimum) thick black polyethylene tag holder.
      c. Provide a one-piece nylon, self-locking tie at each end of the cable tag.
      d. Ties shall have a minimum loop tensile strength of 175 pounds. The cable tags shall have black block letters, numbers, and symbols one inch high on a yellow background.
      e. Letters, numbers, and symbols shall not fall off or change positions regardless of the cable tag's orientation.
   3. Manufacturers:
      a. Brady
      b. Or equal.

2.3 CLOSET HARDWARE LABELS

A. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.
B. Shall be preprinted or computer printed type. Handwritten labels are not acceptable.
C. Where insert type labels are used provide clear plastic cover over label.
D. Manufacturer:
   1. Copper Patch Panels
      a. 6 port group
         i. Ortronics OR-70700408
         ii. Or equal.
      b. Patch Panel Name Label
         i. Brady
         ii. Or equal.

2.4 GROUNDING AND BONDING, PATHWAY, AND SPACE LABELS

A. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
B. Shall be preprinted or computer printed type. Handwritten labels are not acceptable.
C. Manufacturers:

1. Brady Corporation
   a. TLS2200 labels
      i. PTL-20-422, Size 2.0" x 1.0"
      ii. PTL-22-422, Size 3.0" x 1.0"
      iii. PTL-37-422, Size 3.0" x 1.9"
      iv. PTL-23-422, Size 4.0" x 1.0"
      v. PTL-38-422, Size 4.0" x 1.0"
   b. Laser printable labels
      i. LAT-13-747, Size 1.875" x 0.833"
      ii. LAT-24-747, Size 1.75" x 1.0"
      iii. LAT-32-747, Size 3.0" x 0.9"
      iv. LAT-33-747, Size 2.0" x 1.437"
      v. LAT-34-747, Size 3.0" x 1.437"
   c. Continuous tape for TLS2200
      i. PTL-8-422, Size 0.5", white polyester
      ii. PTL-8-430, Size 0.5", clear polyester
      iii. PTL-8-439, Size 0.5", white vinyl
      iv. PTL-42-439, Size 1.0", white vinyl
      v. PTL-43-439, Size 1.9", white vinyl
2. Or equal.

2.5 WORKSTATION LABELS

A. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
B. Shall be preprinted or computer printed type. Handwritten labels are not acceptable.
C. Where insert type labels are used provide clear plastic cover over label.
D. Manufacturers:
   1. Ortronics OR-70400411
   2. Or equal.

2.6 NAMEPLATES

A. Field Fabricated Nameplates
   1. Features/Function/Construction
      a. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings.
      b. Comply with ASTM D 709.
      c. Each nameplate inscription shall identify the function and, when applicable, the position.
      d. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core.
      e. Surface shall be matte finish.
      f. Corners shall be square.
      g. Accurately align lettering and engrave into the core.
      h. Minimum size of nameplates shall be 1" x 2.5".
      i. Lettering shall be a minimum of 0.25 inch high normal block style.

PART 3 EXECUTION

3.1 GENERAL

A. Apply labeling to clean surfaces free of oil, dust, solvents, or loose material.
B. Apply after Project painting in area of application is complete.
C. Apply to locations where labeling will not be damaged, covered over, or in the way of the infrastructure or system.
D. Apply labeling right side up, parallel to major edges of surfaces to which it is applied. When no line is evident, apply parallel to the floor line. Correct conditions of labeling applied out of true.
E. Protect installed labeling from damage.
F. Replace labeling that is defaced, illegible or peeling off the surface to which it is applied.

3.2 IDENTIFICATION & LABELING

A. The Owner will provide the Contractor copies of the Contract Drawings showing station outlets with Owner assigned data & voice jack ID numbers. Label all installed work according to this master set.
B. Workstation faceplates
   1. Workstation faceplates shall be labeled according to the format *fs-n*, where:

      f = numeric character(s) identifying the floor of the building occupied by the BDF

      s = alpha character(s) uniquely identifying the BDF on floor *f*, or the building area in which the BDF is located

      n = three numeric characters designating the port on a patch panel on which a four-pair horizontal cable is terminated in the BDF

      Example: Faceplate with cables terminating on the 6th ports of each patch panel in the second BDF on the first floor is identified as:

      1B-006

   2. The cover plate areas directly above and beneath the jacks are the labeling areas. In the top area, using the specified means, label the faceplate number assigned on the contract documents.
C. Pathways
   1. Pathways shall be marked at each endpoint and at all intermediate pull or junction boxes. In the case of partitioned pathways (i.e. innerduct) each partition shall have a unique identifier.
   2. Use adhesive type labels as specified in the Products portion of this section.
D. Labels shall be affixed at the entry to all telecommunications rooms and spaces (including entrance facilities, communication equipment rooms, communication equipment spaces and work areas).

1. Use adhesive type labels for all communications space labeling as specified in the Products portion of this section.
2. Affix labels to entrance doors – coordinate location with Owner's Representative.

E. Cables

1. Horizontal, Building Backbone, and Campus Backbone cables shall be marked within 12" of each endpoint or to innerduct in which the cable is installed.
2. Except where installed in innderduct or conduit, all backbone fiber optic cable shall have affixed to the outer jacket, labels of a bright color that contain at least the legend "FIBER OPTIC CABLE." These labels must be affixed at intervals no greater than 10 ft.
3. Within every manhole, vault, or pullbox and within 4 ft of the entrance into a building every backbone cable's assigned identifier shall be affixed to either the cable's outer jacket or to an innerduct in which the cable is installed.
4. Any cable installed in conduit shall be labeled at all intermediate pull or junction boxes.
5. Use adhesive type labels as specified in the Products portion of this section.
6. Affix labels to cables – marking cables is not permitted.
7. Where cable is fully encased in innerduct, label the outside of the innerduct with the cable label and, where the contents are fiber optic cabling, the "FIBER OPTIC CABLE" label.
8. Horizontal cables shall be labeled according to the format fs-an, where:

   f = numeric character(s) identifying the floor of the building occupied by the BDF

   s = alpha character(s) uniquely identifying the BDF on floor *f*, or the building area in which the BDF is located

   a = one or two alpha characters uniquely identifying a single patch panel or a group of patch panels with sequentially numbered ports

   n = three numeric characters designating the port on a patch panel on which a four-pair horizontal cable is terminated in the BDF

   Example: 9th cable terminating on the first patch panel in the 3rd BDF on the 8th floor is identified as:

   8C-A009

9. A unique building backbone pair or optical fiber identifier shall be used to identify each single copper pair or each single optical fiber in a backbone cable between two BDFs in one building, and shall have a format fs_1/fs_2-*n.d*, where:

   fs_1/fs_2-*n* = a building backbone cable identifier

d = two to four numeric characters identifying a single copper pair or a single optical fiber

Example: Building backbone fiber connecting BDFs 1A and 2A within a building

Cable 1, Pair 1 = 1A/2A-1.1,2
Cable 1, Pair 2 = 1A/2A-1.3,4
Cable 1, Pair 3 = 1A/2A-1.5,6

10. A unique campus backbone pair or optical fiber identifier shall be assigned to each pair or optical fiber in a backbone cable connecting BDFs in different buildings, and it shall have the format $[b_1\text{-}fs_1]/[b_2\text{-}fs_2]$-n.d, where:

$[b_1\text{-}fs_1]/[b_2\text{-}fs_2]$-n = campus backbone cable identifier
d = two to four numeric characters identifying a single copper pair or a single optical fiber

Example: Campus backbone fiber Cables 1 and 2 connecting Building SLO101, BDF 1A, and Building SLO108, BDF 1B

Cable 1, Pair 1 = [SL0101-1A]/[SL0108-1B]-1.1,2
Cable 1, Pair 2 = [SL0101-1A]/[SL0108-1B]-1.3,4

Cable 2, Pair 1 = [SL0101-1A]/[SL0108-1B]-2.1,2
Cable 2, Pair 2 = [SL0101-1A]/[SL0108-1B]-2.3,4

F. Patch Panels

1. Fiber patch panels shall be marked using adhesive labels indicating the identifiers of all fibers installed to them.
2. If not shown on the contract documents, Owner's Representative will provide specific fiber ID information.
3. Category rated patch panels shall be labeled according to the format fs-a, where:

f = numeric character(s) identifying the floor of the building occupied by the BDF

s = alpha character(s) uniquely identifying the BDF on floor *f*, or the building area in which the BDF is located

a = one or two alpha characters uniquely identifying a single patch panel or a group of patch panels with sequentially numbered ports

Example: First patch panel in the first BDF of the first floor is identified as:

1A-A

G. 66 Blocks

1. Each cable termination position on 66 blocks shall be labeled with number designators.
   a. All backbone copper cable termination blocks shall be labeled with both the pair count of every 5th pair and the cable's assigned identifier.

H. Grounding and Bonding

1. The Telecommunications Main Grounding Busbar (TMGB) shall be labeled as such with an adhesive type label affixed reading TMGB.
2. The Telecommunications Grounding Busbar (TGB) within a BDF shall be labeled as such with an adhesive type label affixed which follows the format TGB-*fs*, where:

   TGB = Telecommunications Grounding Busbar

   f = numeric character(s) identifying the floor of the building occupied by the BDF

   s = alpha character(s) uniquely identifying the BDF on floor *f*, or the building area in which the BDF is located

3. The conductor connecting the TMGB to the building ground shall be labeled at each end with an adhesive label affixed in a visible location as close as practicable to the bonding point at each end of the conductor. The label shall follow the format BC-TMGB, where:

   BC = Bonding Conductor

   TMGB = Telecommunications Main Grounding Busbar

   f = numeric character(s) identifying the floor of the building occupied by the BDF

   s = alpha character(s) uniquely identifying the BDF on floor *f*, or the building area in which the BDF is located

4. The conductor connecting the TGB within a BDF to the building ground shall be labeled at each end with an adhesive label affixed in a visible location as close as practicable to the bonding point at each end

of the conductor. The label shall follow the format BC-TGB-*fs*, where:

BC = Bonding Conductor

TGB = Telecommunications Grounding Busbar

f = numeric character(s) identifying the floor of the building occupied by the BDF

s = alpha character(s) uniquely identifying the BDF on floor *f*, or the building area in which the BDF is located

I. Firestops

1. Each firestop shall be labeled at each location where firestopping is installed, on each side of the penetrated fire barrier, within 12 inches of the firestopping material.
2. Firestops shall be labeled according to the format FS-fn, where:

FS = Firestop

f = numeric character(s) identifying the floor of the building occupied by the BDF

n = three numeric characters designating firestop sequential number.

END OF SECTION

SECTION 17100
STRUCTURED CABLING, BASIC MATERIALS & METHODS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This Section defines commons means and methods for the work of the following Sections:
   1. Section 17116 - Communications Cabinets, Racks, Frames and Enclosures.
   2. Section 17119 - Communications Termination Blocks and Patch Panels.
   3. Section 17123 - Communications Cable Management.
   4. Section 17150 - Communications Horizontal Cabling.

B. Related work specified in other Sections.
   1. Section 16080 - Electrical Commissioning.
   2. Section 16261 - Static Uninterruptible Power Supply.
   3. Section 16620 - Fire Alarm System.
   4. Section 17054 - EMCS - Communications Devices.

1.2 RELATED DOCUMENTS

A. Section 17010 - Common Work Results for Communications applies to the work of this Section.

1.3 REERENCES

A. Usage: In accordance with Section 01110 - Summary of Work.

B. In addition to the requirements of Section 17010 - Common Work Results for Communications, conform to the applicable portions of the following standards agencies:
   1. American Society for Testing and Materials (ASTM).
      a. ASTM A228/A228M-02 Steel Wire, Music Spring Quality.
   2. Bellcore.
      a. TR-NWT-000253Intermediate Reach, 1,OC3.
   3. Telecommunications Industry Association/Electronic Industries Association (TIA/EIA)Telecommunications Industry Association/Electronic Industries Association (TIA/EIA).
      a. TIA/EIA-455-B Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and other Fiber Optic Components (ANSI/TIA/EIA-455-B-98) Oct. 1998.
      b. TIA/EIA-455-1-BFOTPl - Cable Flexing for Fiber Optic Interconnecting Devices (ANSI/TIA/EIA-455-1B-98) Oct. 1998.
      c. TIA/EIA-455-2-CFOTP2 - Impact Test Measurements for Fiber Optic Devices (ANSI/TIA/EIA0455-2C-98) Jul. 1998.
      d. TIA/EIA-455-3-AFOTP3 - Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components (May 1989).

e. TIA/EIA-455-5-CFOTP5 - Humidity Test Procedure for Fiber Optic Components (ANSI/TIA/EIA-455-5C-2002).
f. TIA/EIA-455-7FOTP7 - Numerical Aperture of Step-Index Multimode Optical Fibers by Output Far-Field Radiation Pattern Measurement (ANSI/TIA/EIA-455-7-92) Dec. 1992.
g. TIA/EIA-455-11-BFOTP11 - Vibration Test Procedure for Fiber Optic Components and Cables (ANSI/TIA/EIA-455-11B-94) Jut. 1994.
h. TIA/EIA-455-13-AFOTP13 - Visual and Mechanical Inspection of Fiber Optic Components, Devices, and Assemblies (ANSI/TIA/EIA-455-13A-02).
i. TIA/EIA-455-20-BFOTP20 - IEC60793-1-26 Optical Fibers - 1-46: Measurement Methods and Test Procedures - Monitoring of Changes in Optical Transmittance (ANSI/TIA/EIA-455-20-B-2004).
j. EIA TIA-455-21-A(2) FOTP-21 (r2002) - Mating Durability of Fiber Optic Interconnecting Devices.
k. TIA/EIA-455-25-CFOTP25 - Impact Testing of Optical Fiber Cables and Cable Assemblies (ANSI/TIA/EIA-455-25C-2002).
l. TIA/EIA-455-31-CFOTP31 - Proof Testing Optical Fibers by Tension (ANSI/TIA/EIA-455-31C-95) (R04).
m. TIA-455-33BFOTP33 -Optical Fiber Cable Tensile Loading and Bending Test 2005.
n. TIA/EIA-455-34-AFOTP34 - Interconnection Device Insertion Loss Test (ANSI/TIA/EIA-455-34A-99).
o. TIA/EIA-455-37-AFOTP37 - Low or High Temperature Bend Test for Fiber Optic Cable (ANSI/TIA/EIA-455-37A-93) (R-2002).
p. TIA/EIA-455-38FOTP38 - Measurement of Fiber Strain in Cables Under Tensile Load (ANSI/TIA/EIA-455-38-95) Nov. 1995.
q. TIA/EIA-455-39-BFOTP39 - Fiber Optic Cable Water Wicking Test (ANSI/TIA/EIA-45 5- 39B-03).
r. TIA/EIA-455-41-AFOTP41 - Compressive Loading Resistance of Fiber Optic Cables (ANSI/TIA/EIA-455-41A-01).
s. TIA/EIA-455-42-AFOTP42 - Optical Crosstalk in Fiber Optic Components (ANSI/TIA/EIA-455-42-A-1989) (R2001).
t. TIA/EIA-455-43-AFOTP43 - Output Near-Field Radiation Pattern Measurement of Optical Waveguide Fibers (ANSI/TIA/EIA-455-43A-99) Oct. 1999).
u. TIA/EIA-455-54-BFOTP54 - Mode Scrambler Requirements for Overfilled Launching Conditions to Multimode Fibers (ANSI/TIA/EIA-455-54B-98) (R2001).
v. TIA/EIA-455-56-BFOTP56 -Test Method for Evaluating Fungus Resistance of Optical Fiber and Cable (ANSI/TIA/EIA-455-56B-95) (R2004).

w. TIA/EIA-455-57-BFOTP57 - Preparation and Examination of Optical Fiber Endface for Testing Purposes (ANSI/TIA/EIA-455-57B-96) (R2000).
x. TIA/EIA-455-64FOTP64 - Procedure for Measuring Radiation-Induced Attenuation in Optical Fibers and Optical Cables (ANSI/TIA/EIA-455-64-97) (R2002).
y. TIA/EIA-455-67AFOTP67 - IEC 60793-1-51 Optical Fibers Part 1-51: Measurement Methods and Test Procedures - Dry Heat (ANSI/TIA-455-67 -A-2003).
z. TIA/EIA-455-72FOTP72 - Procedure for Measuring Temperature and Humidity Cycling Aging Effects on Optical Characteristics of Optical Fibers (ANSI/TIA/EIA-455-72-97) (R2001).
aa. TIA/EIA-455-73FOTP73 - Procedure for Measuring Temperature and Humidity Cycling Aging Effects on Mechanical Characteristics of Optical Fibers. (ANSI/TIA/EIA-455-73-97) (R2001).
ab. TIA/EIA-455-74AFOTP74 - IEC 60793-1-53 Optical Fibers Part 1-53: Measurement Methods and Test Procedures - Water Immersion.
ac. TIA/EIA-455-78-BFOTP-78 - IEC 60793-1-40 Optical Fibers Part 140: Measurement Methods and Text Procedures – Attenuation.
ad. TIA/EIA-455-80-CFOTP80 - IEC 60793-1-53 Optical Fibers Part 1-44: Measurement Methods and Test Procedures - Cut-off.
ae. TIA/EIA-455-84-BFOTP84 - Jacket Self-Adhesion (Blocking) Test for Fiber Optic Cable (ANSI/TIA/EIA-455-84B-98) (R 2003).
af. TIA/EIA-455-85-AFOTP85 - Fiber Optic Cable Twist Test (ANSI/TIA/EIA-455-85A-92) (R99) May. 1999.
ag. TIA/EIA-455-86FOTP86 - Fiber Optic Cable Jacket Shrinkage (ANSI/TIA/EIA-455-86-83) (R 90) (R99) May. 1999.
ah. TIA/EIA-455-87-BFOTP87 - Fiber Optic Cable Knot Test (ANSI/TIA/EIA-455-87B-93) (R99) May. 1999.
ai. TIA/EIA-455-88FOTP88 - Fiber Optic Cable Bend Test Jun. 2001.
aj. TIA/EIA-455-89-BFOTP89 - Optical Fiber Cable Jacket Elongation and Tensile Strength (ANSI/TIA/EIA-455-89B-98) (R 2003).
ak. TIA/EIA-455-91FOTP9l - Fiber Optic Cable Twist-Bend Test (ANSI/TIA/EIA-455-9l-86) (R 2003).
al. TIA/EIA-455-95-AFOTP95 - Absolute Optical Power Test for Optical Fibers and Cables (ANSI/TIA/EIA-455-95-A-2000) Apr. 2000.
am. TIA/EIA-455-l 00-AFOTP100 - Gas Leakage Test for Gas-Blocked Fiber Optic Cables (ANSI/TIA/EIA-455-l00A-89) (R99) May. 1999.
an. TIA/EIA-455-l04-AFOTP104 - Fiber Optic Cable Cyclic Flexing Test (ANSI/TIA/EIA-455-l04A-93)(R2000) Jul. 2000.
ao. TIA/EIA-455-1 07-AFOTP 1 07 - Determination of Component Reflectance or Link/System Return Loss Using a Loss Test Set (ANSI/TIA/EIA-455-107A-99) Feb. 1999.

ap. TIA/EIA-455-111FOTP111 - Procedure for the Measurement of Optical Fiber Curl (ANSI/TIA/EIA-455-111-2000) Jul. 2000.

aq. TIA/EIA-455-113FOTP113 - Polarization-Mode Dispersion Measurement of Single-Mode Optical Fibers by the Fixed Analyzer Method (ANSI/TIA/EIA-455-113-96) (R 2001).

ar. TIA/EIA-455-122AFOTP122 - Polarization-Mode Dispersion Measurement for Single-Mode Optical Fibers by Stokes Parameter Evaluation (ANSI/TIA/-455-122-A-02).

as. TIA/EIA-455-123FOTP123 - Measurement of Optical Fiber Ribbon Dimensions (ANSI/TIA/EIA-455-123-2000) Jun. 2000.

at. TIA/EIA-455-124AFOTP124 - Polarization-Mode Dispersion Measurement for Single-Mode Optical Fibers by Interferometry (ANSI/TIA/EIA-455-124-A-04).

au. TIA/EIA-455-126FOTP126 - Spectral Characterization of LEDs (ANSI/TIA/EIA-455-126-2000) Feb. 2000.

av. TIA/EIA-455-128FOTP128 - Procedures for Determining Threshold Current of Semiconductor Lasers (ANSI/TIA/EIA-455-128-96) (R 2003).

aw. TIA/EIA-455-129FOTP129 - Procedures for Applying Human Body Model Electrostatic Discharge Stress to Package Optoelectronic Components (ANSI/TIA/EIA-455-129-96) (R 2003).

ax. TIA/EIA -4 5 5-131 FOTP 131 - Measurement of Optical Fiber Ribbon Residual Twist (ANSI/TIA/EIA-455-131-97) (R2000) Oct. 2000.

ay. TIA/EIA-455-132-AFOTP132 - Measurement of the Effective Area of Single-Mode Optical Fiber (ANSI/TIA/EIA-455-132-2001) Jun. 2001.

az. TIA/EIA-455-133AFOTP133 IEC-60793-1-22 Optical Fibers - Part 1-22: Measurement Methods and Test Procedures - Length (ANSI/TIA-455-133-A-03).

ba. TIA/EIA-455-134FOTP134 - Measurement of Connector Ferrule Hole Inside Diameter (ANSI/TIA/EIA-455-134-96) (R 2002).

bb. TIA/EIA-455-135FOTP135 - Measurement of Connector Ferrule Inside and Outside Diameter Circular Runout (ANSI/TIA/EIA-455-135-96) (R 2002).

bc. TIA/EIA-455-141FOTP141 - Twist Test for Optical Fiber Ribbons (ANSIITIA/EIA-455-141-1999) Oct. 1999.

bd. TIA/EIA-455-157FOTP157 - Measurement of Polarization Dependent (PDL) of Single-mode Fiber Optic Components (ANSI/TIA/EIA-455-157-2000) May. 2000.

be. TIA/EIA-455-158FOTP158 - Measurement of Breakaway Frictional Force in Fiber Optic Connector Alignment Sleeves (ANSI/TIA/EIA-455-158-97) (R 2001).

bf. TIA/EIA-455-160AFOTPI60 - IEC 60793-1-50 Optical Fibers - Part 1-50: Measurement Methods and Test Procedures - Damp Heat (Steady State) (ANSI/TIA-455-160-A-03).

bg. TIA/EIA-455-162-AFOTPI62 - Fiber Optic Cable Temperature-Humidity Cycling (ANSIITIAIEIA-455-162A-99) Aug. 1999.

bh. TIA/EIA-455-175-BFOTPI75 - IEC 60793-1-42 Optical Fibers Part 1-42: Measurement Methods and Test Procedures - Chromatic Dispersion (ANSI/TIA-455-175-B-03).

bi. TIA/EIA-455-176AFOTPI76 - IEC 60793-1-20 Optical Fibers Part 1-20: Measurement Methods and Test Procedures - Fiber Geometry (ANSI/TIA-455-176-A-03).

bj. TIA/EIA-455-177-BFOTPI77 - IEC 60793-1-43 Optical Fibers Part 1-43: Measurement Methods and Test Procedures - Numerical Aperture (ANSI/TIA-455-177-B-03).

bk. TIA/EIA-455-178-BFOTPI78 - IEC 60793-1-32 Optical Fibers Part 1-32: Measurement Methods and Test Procedures - Coating Stripability (ANSI/TIA-455-178-B-03).

bl. TIA/EIA-455-180-AFOTPI80 - Measurement of the Optical Transfer Coefficients of a Passive Branching Device (Coupler) (ANSI/TIA/EIA-455-180-A-99) Dec. 1999.

bm. TIA/EIA-455-181FOTPI81 - Lightning Damage Susceptibility Test for Fiber Optic Cables with Metallic Components (ANSI/TIA/EIA - 455-181-92) (2001) Jul. 2001.

bn. TIA/EIA-455-183FOTPI83 - Hydrogen Effects on Optical Fiber Cable (ANSI/TIA/EIA-455-183-2000) Jul. 2000.

bo. TIA/EIA-455-184FOTPI84 - Coupling Proof Overload Test for Fiber Optic Interconnecting Devices (ANSI/TIA/EIA-455-184-91) (R95) (R99) Oct. 1999.

bp. TIA/EIA-455-185FOTPI85 - Strength of Coupling Mechanism for Fiber Optic Interconnecting Devices (ANSI/TIA/EIA-455-185-91) (R95) (R99) Oct. 1999.

bq. TIA/EIA-455-186FOTPI86 - Gauge Retention Force Measurement for Fiber Optic Components (ANSI/TIA/EIA-455-186-91) (R 2004).

br. TIA/EIA-455-187FOTPI87 - Engagement and Separation Force Measurement of Fiber Optic Connector Sets (ANSI/TIA/EIA-455-187-91) (R 2004).

bs. TIA/EIA-455-191-BFOTPI91 - IEC 60793-1-45 Optical Fibers Part 1-45: Measurement Methods and Test Procedures - Mode Field Diameter (ANSI/TIA-455-191-B-2003).

bt. TIAIEIA-455-192FOTPI92 - H-Parameter Test Method for Polarization- Maintaining Optical Fiber (ANSIfTIAIEIA-455-192-99) May. 1999.

bu. TIA/EIA-455-193FOTPI93 - Polarization Crosstalk Method for Polarization-Maintaining Optical Fiber and Components (ANSI/TIA/EIA-455-193-99) May. 1999.

bv. TIA/EIA-455-194FOTPI94 - Measurement of Fiber Pushback in Optical Connectors (ANSI/TIA/EIA-455-194-2000) Jan. 2000.

bw. TIA/EIA/455-195AFOTPI95 - IEC 60793-1-21 Optical Fibers - Part 1-21: Measurement Methods and test Procedures - Coating Geometry (ANSI/TIA-455-195-A-2003).

bx. TIA/EIA-455-197rOTPI97 - Differential Group Delay Measurement of Single-mode Components and Devices by the Differential Phase Shift Method (ANSI/TIA/EIA-455-197-2000) Jul. 2000.

by. TIA/EIA-455-201FOTP201 - Return Loss of Commercial Polarization - Maintaining Fiber or Polarizing Fiber Pigtailed Devices and Cable Assemblies Aug. 2001.

bz. TIA/EIA-455-203FOTP203 - Launched Power Distribution Measurement Procedure for Graded-Index Multimode Fiber Transmitters (ANSI/TIA/EIA-455-203-2001) Jun. 2001.

ca. TIA/EIA-455-204FOTP204 - Measurement of Bandwidth on Multimode Fiber (ANSI/TIA/EIA-455-204-2000) Dec. 2000.

cb. TIA/EIA-4920000-B Generic Specification for Optical Waveguide Fibers (ANSI/TIA/EIA-4920000-B-97) (R2002).

cc. TIA/EIA-492AOOO-A Sectional Specification for Class Ia Multimode, Graded-Index Optical Waveguide Fibers (ANSI/TIA/EIA-492AOOO-A-97) (R 2002).

cd. TIA/EIA-492AAAA-A Detail Specification for 62.5-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers (ANSI/TIA/EIA-492AAAA-A-98) (R 2002).

ce. TIA/EIA-492AAAB Detail Specification for 50-urn Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers (ANSI/TIA/EIA-492AAAB-98) (R 2002).

cf. TIA/EIA-492COOO Sectional Specification for Class IVa DispersionUnshifted Single-Mode Optical Fibers (ANSI/TIA/EIA-492COOO-98) (R 2002).

cg. TIA/EIA-492CAAA Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers (ANSI/TIA/EIA-492CAAA-98) May 1998 (R 2002).

ch. TIA/EIA-492CAAB Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak (ANSI/TIA/EIA-492CAAB-2000) Sep.2000.

ci. TIA/EIA-492EOOO Sectional Specification for Class IV d NonzeroDispersion Single-Mode Optical Fibers for the 1550 nm Window (ANSI/TIA/EIA-492EOOO-96) (R 2002).

cj. EIA/TIA-526-7 OFSTP-7 - Optical Power Loss of Installed Single-Mode Fiber Cable Plant (2003).

ck. EIA/TIA-526-14A OFSTP-14 - Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant (1998) (R 2003).

cl. TIA-559 Single-Mode Fiber Optic System Transmission Design Mar. 1989 (R 2002).
cm. TIA/EIA-568-B.1 Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements (ANSI/TIA/EIA-568-B.1-2001).
cn. TIA/EIA-568-B.l-1 Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements - Addendum 1 - Minimum 4-Pair UTP and 4-Pair ScTP Patch Cable Bend Radius (ANSI/TIA/EIA-568-B.I-I-2001).
co. TIA/EIA-568-B.2 Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components (ANSI/TIA/EIA-568-B.2-2001).
cp. TIA/EIA-568-B.3 Optical Fiber Cabling Components Standard (ANSI/TIA/EIA -568- B.3-2000).
cq. TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces.
cr. EIA TIA/EIA-604-2-A-2003 FOCIS 2 Fiber Optic Connector Intermateability Standard, Type Fiber Jack Connector.
cs. EIA TIA/EIA-604-3A(2000) FOCIS 3 Fiber Optic Connector Intermateability Standard - Standard Type SC.
ct. EIA TIA/EIA-604-12(2000) FOCIS 12 Fiber Optic Connector Intermateability Standard Type MT-RJ.
cu. EIA TIA/EIA-606-A(2002) Administration Standard for the Telecommunications Infrastructure (ANSI/TIA/EIA-606).

4. Federal Communications Commission (FCC).
   a. The Code of Federal Regulations, Title 47, Telecommunications, Chapter 1 - FCC Part 68 (1982 issue or latest revision) (47 CFR 68).
5. Institute of Electrical and Electronic Engineers.
   a. IEEE 383-2003 Standard for Qualifying Class IE Electric Cables and Field Splices for Nuclear Power Generating Stations.
   b. IEEE 100-00 The Authoritative Dictionary of IEEE Standards Terms.
6. Insulated Cable Engineers Association (ICEA).
   a. ICEA S-56-434 (1983, 5th Ed.) Polyolefin Insulated Communication Cables for Outdoor Use.
   b. ICEA S-83-596(2001) Fiber Optic Premises Distribution Cable.
   c. ICEA S-90-661(2002) Category 3,5 and 5e Individually Unshielded Twisted Pair Indoor Cables With or Without Overall Shield for use in General Purpose and LAN Communications Wiring Systems - Technical Requirements.
7. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA).
   a. NEMA WC 63.1(2000) Twisted Pair Premise Voice and Data Communications Cables.
8. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA).

a. NFPA 70 National Electrical Code.

9. Underwriters Laboratories, Inc. (UL).
   a. UL 444(2002; Bul. 2002, 2003) Communications Cables.
   b. UL 910(1998) Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air.
   c. UL 1286(1999; R 2004) Office Furnishings.
   d. UL 1581 Reference Standard for Electrical Wires, Cables, and Flexible Cords. Oct. 2001.
   e. UL 1666(2000; R 2002) Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.
   f. UL 1863(2000; R 2004) Communications Circuit Accessories.

1.4 DEFINITIONS

A. Unless otherwise specified or indicated, electrical and electronics terms used in this specification shall be as defined in:
   1. ANSI/TIA/EIA-568-B.l.
   2. ANSI/TIA/EIA-568-B.2,
   3. ANSI/TIA/EIA-568-B.3,
   4. ANSI/TIA/EIA-569-B,
   5. ANSI/TIA/EIA-606-A,
   6. IEEE Std 100 and
   7. this Section.

B. Campus Distributor (CD) - A distributor from which the campus backbone cabling emanates. (International expression for main cross-connect (MC).)

C. Building Distribution Facility (BDF) - A distributor in which the building backbone cables terminate and at which connections to the campus backbone cables may be made. (International expression for intermediate cross-connect (IC).)

D. Floor Distributor (FD) - A distributor used to connect horizontal cable and cabling subsystems or equipment. (International expression for horizontal cross-connect (HC).)

E. Telecommunications Room (TR) - An enclosed space for housing telecommunications equipment, cable, terminations, and cross-connects. The room is the recognized cross-connect between the backbone cable and the horizontal cabling.

F. Entrance Facility (EF) - An entrance to the building for both private and public network service cables (including antennae) including the entrance point at the building wall and continuing to the entrance room or space.

G. Equipment Room (ER) - A centralized space for telecommunications equipment that serves the occupants of a building. Equipment housed therein is considered distinct from a telecommunications room because of the nature of its complexity.

H. Open Cabling - Cabling that is not run in a raceway as defined by NFPA 70. This refers to cabling that is "open" to the space in which the cable has been installed and is therefore exposed to the environmental conditions associated with that space.

I. Open Office - A floor space division provided by furniture, movable partitions, or other means instead of by building walls.

J. Pathway - A physical infrastructure utilized for the placement and routing of telecommunications cable.

1.5 SUBMITTALS

A. Conform with the requirements of Section 01300 - Administrative Requirements and Section 17010 - Common Work Results for Communications.

1.6 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 01600 - Product Requirements, Section 17010 - Common Work Results for Communications Systems and the following:

B. Shipping Conditions:
   1. All cable shall be shipped on reels or manufacturer supplied "handy boxes".
   2. The diameter of the drum shall be at least 13 times the diameter of the cable.
   3. The reels shall be substantial and so constructed as to prevent damage during shipment and handling.
   4. Secure the outer end of the cable to the reel head so as to prevent the cable from becoming loose in transit.
   5. Project the inner end of the cable into a slot in the side of the reel, or into a housing on the inner slot of the drum, in such a manner and with sufficient length to make it available for testing.
   6. The inner end shall be fastened so as to prevent the cable from becoming loose during installation. End seals shall be applied to each of the cables to prevent moisture from entering the cable.

C. Storage:
   1. Retain factory cable protection until installation. Supplement with heavy gauge plastic sheeting if factory protective membrane is pierced prior to installation. Tape ends and seams water and dust tight.
   2. The reels with cable shall be suitable for outside storage conditions when the temperature ranges from minus 40 degrees C to plus 65 degrees C, with relative humidity from 0 to 100 percent.
   3. Protect cable reels from physical damage from site construction vehicles or from settling into the soil.
   4. Equipment, other than cable, to be delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt and dust, or other contaminants.

1.7 SEQUENCING

A. Not Used.

1.8 PERFORMANCE STANDARDS

A. Telephone (Voice) Copper Cabling Plant:
   1. Suitable for direct connection to the Public Switched Network in accordance with rules set forth by FCC Part 68, California Public Utilities Commission, and other Authorities Having Jurisdiction.
   2. Category 3 as defined in TIA/EIA-568-B.2 paragraph 4.4.

B. Horizontal (Station) Copper Cabling – Permanent Link.
   Category 6, as defined in ANSI/TIA/EIA-568-B.2-1, Chapter 7 (*Cabling Transmission Requirements*), with the test measurements performed in accordance with ANSI/TIA/EIA-568-B.2-1, Annex A (*Cabling [field] measurement procedures*

[normative]) using a Level III field tester, as defined in ANSI/TIA/EIA-568-B.2-1, Annex B (*Test Instruments [normative]*). Cabling shall meet or exceed the requirements stated therein.

C. Fiber Optic Cabling
   1. Optical Budget, any end to end link not to exceed the sum of the following:
      a. Optical fiber loss (attenuation).
      b. Splice loss.
      c. Connector loss.
   2. Optical fiber loss shall be the optical fiber specified cable performance, pro-rated for total link distance.
      a. Fiber Loss, Multimode, not to exceed:
         i. At 850 nanometers, 3.0 dB per Kilometer.
         ii. At 1300 nanometers, 1.0 dB per Kilometer.
      b. Fiber Loss, Single mode, Outside Plant Cable, not to exceed:
         i. At 1310 nanometers, 0.35 dB per Kilometer.
         ii. At 1550 nanometers, 0.25 dB per Kilometer.
      c. Fiber Loss, Single mode, Campus Backbone Cable, not to exceed:
         i. At 1310 nanometers, 0.4 dB per Kilometer.
         ii. At 1550 nanometers, 0.3 dB per Kilometer.
   3. Splice Loss.
      a. Multimode.
         i. 0.15 dB for each fusion splice.
      b. Single Mode.
         i. 0.06 dB for each fusion splice.
   4. Connector Loss
      a. Multimode.
         i. 0.75 dB for each mated pair of type SC Connector.
      b. Single Mode.
         i. 0.75 dB for each mated pair of type SC, Ultra Physical Contact Connector.
         ii. 0.30 dB for each mated pair of type SC, Angled Physical Contact Connector.

1.9 TESTING

A. GENERAL
   1. Test and report on each intermediate cabling segment separately, including station cabling, horizontal distribution (each segment, if multiple) and telecommunications room wiring.
   2. Test each end-to-end cable link.
   3. Submit machine-generated documentation and raw data of all test results on Contractor-provided, and Owner's Representative approved, forms; and in electronic format approved by the Owner's Representative.
   4. Provide machine-generated data on an appropriate disk media (CD-ROM CD-R format) to be transferred to the Owner's computers.

a. Where the machine-generated documentation requires use of a proprietary computer program to view the data, provide the Owner with 1 licensed copy of the software.

5. Provide registered testing software used for the actual tests to the Owner for review of test data.

B. Test Equipment:

1. Provide in conformance with the applicable requirements of 17010 Common Work Results for Communications.
2. Test systems using at least one (1) each of the following test measurement devices or their functional equivalents:
   a. Level III Category Category 6 Cable Tester – Agilent, Fluke, or equal.
   b. Outside Plant Voice Cabling Plant tester - capable of detecting shorts, opens, reversals, mis-wiring and crosstwists. (Siemon STM-8, Fluke or equal).
   c. Tone Test Sets.
   d. Optical power meter (HP, Corning Cable Systems, Fluke or equal). Site portable communications systems (walkie-talkie, cell phone or similar).
   e. Site portable communications systems (walkie-talkie, cell phone or similar).
   f. Any other items of equipment or materials required to demonstrate conformance with the Contract Documents.

C. Station Wiring, General.

1. Test station wire only after all pairs of station wire in an work area have been terminated at both ends, and no work of this Section or other Sections may cause physical disturbance to the wiring.
2. Correct any and all transpositions found. Retest.
3. If any conductor in a station wire tests either open or short, then the entire station wire is to be removed, replaced, and re-tested.

D. Inside Category 6 Cabling.

1. Using the listed Category 6 cable test set, test 100% of cabling and submit report on the parameters specified for Category 6 cabling in this Section. Report whether tested link passes or fails the Category 6 standards in Part 2 of this Section.
2. Note exceptions to required Category 6 standards. Remedy and retest.

E. Telephone: Outside Plant, Inside Riser Wire:

1. General:
   a. A new cable shall be tested only after all wires within the cable have been terminated at both ends.
   b. For unshielded cable, "measurements to ground" means an electrical connection to the Telecommunications Ground Bus, building steel, electrical metallic conduit or a water pipe.
   c. The Contractor shall correct all defects possible.

d. If less than 100% of cable pairs pass testing, the cable shall be deemed unacceptable and shall be replaced. Contractor shall replace, terminate and test new cable at no additional cost to the Owner.

2. Test procedures:
   a. TEST #1 – Continuity:
      i. Meter set for 20 ohm full scale ohm reading. Each pair shall be shorted at one end and the loop resistance value read at the other.
      ii. The difference between the largest and the smallest resistance reading from each pair in the cable shall be no more than 10 percent of the largest reading.
   b. TEST #2 - Balance, Polarity and Conductor Transpositions:
      i. Upon passing Test #1, the tester at one end of cable shall ground tip side of each pair in turn. The tester at other end of cable reads resistance to building ground of same conductor.
   c. REQUIREMENT: Reading for each tip conductor in pair of approximately one-half the loop resistance value from Test #1.
3. Test Report:
   a. Submit Test Report. Documentation shall include loop resistance regarding any opens, shorts, transpositions found, as well as corrective action taken to correct any found opens, shorts, or transpositions.

F. Fiber Optic Cabling.
1. Perform fiber optic cable testing on all installed fiber optic cabling. Submit test results. Notify Owner's Representative in writing at least 48 hours in advance that fiber optic cable testing shall commence. Submit calibration certification for testing equipment to be used.
2. Submit test report no later than five (5) business days after the cables are tested.
3. Test and submit optical power loss test results on each fiber, in each cable, and in both directions under final installation conditions. Submit with the following information:
   a. Date of test.
   b. Name of test personnel.
   c. Fiber cable type and part number.
   d. Cable Length
   e. Fiber strand number, buffer tube color, and strand color.
   f. TX location.
   g. RX location.
   h. Optical Light Source manufacturer, model and serial number.
   i. Optical Power Meter manufacturer, model and serial number.
   j. Reference standard, with allowable values for cable attenuation, connector loss, and splice loss.
   k. Allowable loss for the link under test, calculated as the sum of cable attenuation plus connector loss plus splice loss.

l. TX wavelength(s).
m. Attenuation in dB at the TX wavelength(s).

4. Acceptance Tests.
   a. Power Meter Attenuation Test.
      i. Perform on all fiber cabling segments.
      ii. Method: Perform the following measured attenuation tests using the method B of ANSIlEIAffIA-526-14A for multimode strands and ANSIlEIA/TIA-526-7 for singlemode strands. Measure the attenuation of the fiber optic network inclusive of all splices and patch points called for on the Drawings.
      iii. Measure attenuation between all the coupling points (when applicable) using the insertion method.
      iv. Perform a reference measurement in dBm to determine the injection power level of the stabilized source. Reference cable shall have the same core diameter as strands under test. Connect the optical source directly to the optical power level meter using 2 reference cables and a coupler.
      v. Connect the optical source to the strand under test using I of the 2 reference cables attached to the strand's terminal coupler.
      vi. Connect the optical power level meter to the other end of the strand under test through its terminating coupler using the other reference cable.
      vii. Obtain the measured attenuation (in dB) by subtracting the reference level (dBm) from the received level (dBm).
         (1) Periodically during the acceptance tests, check and document the reference level.
      viii. Test each fiber link for overall attenuation from end-to-end in both directions.
      ix. Perform the attenuation acceptance test at the 850 nm wavelength for multi-mode and 1310 nm for single-mode.
   b. OTDR Distance and Attenuation Assessments.
      i. Perform acceptance testing of all reels of fiber optic cable prior to installation.
      ii. Perform in accordance with the requirements of:
         (1) ANSI/EIA/TIA-568-B.l.
         (2) ANSI/EIA/TIA-568- B.3.
         (3) TIA/EIA-455-59-A.
      iii. Test and submit strip charts and/or tracer recordings on all strands in each tube in every cable in one direction. Submit with the following information:
         (1) Date of test.
         (2) Name of test personnel.
         (3) Test wavelength.

(4) Pulse duration(s) and scale range(s).
(5) Index of refraction.
(6) Fiber cable type and part number.
(7) Fiber tube and/or fiber strand number.
(8) Direction of test.
(9) Overall distance.
(10) Attenuation in dB.

PART 2 PRODUCTS

2.1 COMMUNICATIONS CABLES AND RELATED

A. General:
1. Cabling shall be UL listed for the application and shall comply with EIA TIA/EIA-568-B.l, TIA/EIA-568-B.2, TIA/EIA-568-B.3 and NFPA 70.
2. Ship cable on reels and/or in boxes bearing manufacture date for UTP in accordance with ICEA S-90-661 and optical fiber cables in accordance with ICEA S-83-596 for all cable used on this project. Cabling manufactured more than 12 months prior to date of installation shall not be used.
3. Comply with applicable Code for insulation, jacket, marking and listing for applicable use.
   a. In plenum spaces, provide type CMP or OFNP cabling.
   b. In riser spaces, provide type CMR or OFNR cabling.
   c. Under outside plant cabling conditions, provide type CM or OFN cabling.

PART 3 EXECUTION

3.1 GENERAL

A. All system cabling and terminations be installed in accordance with the manufacturer's instructions and as shown.
B. All necessary interconnections, services, and adjustments required for a complete and operable system shall be provided. All installation work must be done in accordance with the safety requirements set forth in the general requirements of ANSI C2 and NFPA 70.
C. Coordinate insulation displacement (quick connect) terminal devices with wire size and type. Comply with manufacturer's recommendations. Make connections with automatic impact type tooling set to recommended force.
D. Tin terminated shield drain wires and insulate with heat shrinkable tubing.
E. Dress, lace or harness all wire and cable to prevent mechanical stress on electrical connections. No wire or cable shall be supported by a connection point. Provide service loops where harnesses of different classes cross, or where hinged panels are to be interconnected.
F. Correct unacceptable wiring conditions including but not limited to:
1. Deformed, brittle or cracked insulation.
2. Torn or worn cable jacket.

3. Excessively scored cable jackets.
4. Insulation shrunken or stripped further than 1/8" away from the actual point of connection within a connector, or on a punch block.
5. Ungrommeted, unbushed, or uninsulated wire or cable entries.
6. Deformation or improper radius of wire or cable.

3.2 SPLICING

A. All wire and cable shall be continuous and splice-free for the entire length of run between designated connections or terminations.
   1. At designated splices, maintain conductor color code across all splices.
      a. All shielded cables shall be insulated. Do not permit shields to contact conduit, raceway, boxes, panels or equipment enclosures.
      b. Within buildings, make splices only in designated terminal cabinets and/or on designated equipment backboards.

3.3 PULLING IN

A. Verify that all raceway has been de-burred and properly joined, coupled, terminated, and bushed prior to installation of cables. Verify that all raceway is clear of foreign matter and substances prior to installation of wire or cable.

B. Inspect all conduit bends to verify proper radius. Comply with Code for minimum permissible radius and maximum permissible deformation.

C. Apply a chemically inert lubricant to all wire and cable prior to pulling in conduit. Do not subject wire and cable to tension greater than that recommended by the manufacturer. Use multi-spool rollers where cable is pulled in place around bends. Do not pull reverse bends.

D. Provide a box loop for all wire and cable routed through junction boxes or distribution panels. Cable loops and bends shall not be bent at a radius greater than that recommended by the manufacturer.

3.4 SUPPORT

A. Secure all wire and cable run vertically for continuous distances greater than thirty (30) feet. Secure robust non-coaxial cables with screw-flange nylon cable ties or similar devices appropriate to weight of cable. For all other cables, provide symmetrical conforming nonmetallic bushings or woven cable grips appropriate to weight of cable.

B. Separation. Conform to the following table with respect to separation from power and radio frequency (RF) sources. Provide at least twice the listed separation at fluorescent light fixtures, ballasts and similar high intensity Electromagnetic Field sources, including but not limited to motors, transformers and copiers.

Separation of Telecommunications Cabling and Pathways from 480 V or Lower Power Lines

Condition	Minimum Separation Distance		
	<2kVA	2-5kVA	>5kVA
Unshielded power lines or electrical equipment in proximity to open or nonmetal pathways	5 in.	12 in.	24 in.
Unshielded power lines in proximity to a grounded metal conduit pathway	2.5 in.	6 in.	12 in.
Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to a grounded metal conduit pathway	N/A	3 in.	6 in.

C. Support: Provide support for all cabling. Conform to the restrictions of the National Electric Code and Section 17029.

END OF SECTION

SECTION 17116
COMMUNICATIONS CABINETS, RACKS, FRAMES AND ENCLOSURES

PART 1 GENERAL

1.1 SCOPE OF WORK
A. Communications racks and cabinets.
B. Communications Rack Mounted Power Protection and Power Strips.

1.2 RELATED WORK IN OTHER SECTIONS
A. Section 17026 - Grounding and Bonding for Communications Systems.
B. Section 17033 - Conduits and Backboxes for Communications Systems.
C. Section 17036 - Cable Trays for Communications Systems.
D. Section 17126 - Communications Rack Mounted Power Protection and Power Strips.
E. Section 17150 - Communications Horizontal Cabling.

1.3 REFERENCES
A. American National Standards Institute (ANSI).
   1. EIA-310-D (1992) Cabinets, Racks, Panels, and Associated Equipment (ANSI/EIA/310-D).
   2. ANSI-J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications (ANSIIJ-STD-607-A-2002).
B. International Conference of Building Officials (lCBO).
   1. AC156 ICBO ES Acceptance Criteria for Seismic Qualification Testing of Nonstructural Components (Jul. 2004).
C. Telecordia Technologies.
   1. Network Equipment Building System (NEBS) GR-63-CORE (Seismic Zone 4).

1.4 SUBMITTALS
A. Conform with the requirements of Section 01300 - Administrative Requirements and Section 17010 - Common Work Results for Communications.

1.5 DELIVERY, STORAGE AND HANDLING
A. Procedures: In accordance with Section 01600 - Product Requirements and Section 17100 - Structured Cabling, Basic Materials and Methods.

1.6 SEQUENCING
A. Not used.

PART 2 PRODUCTS

2.1 GENERAL
A. Keys.
   1. Key all boxes, cabinets, enclosures, panels, controls, doors and related provided for similar usage within a system identically.

2.2 EQUIPMENT ENCLOSURE SYSTEMS
A. General:

1. Provide enclosure systems including, but not limited to enclosures, cabinets, cases and related panels and accessories as specified herein. Provide size and quantity as shown on drawings or scheduled.
2. Provide color as shown on drawings. If no color is shown on drawings, submit manufacturer's standard color chips for selection.
3. Provide enclosure systems conforming to the UBC/CBC, latest edition, for seismic design.
4. Equipment Enclosures: Each rack provided with frame angles tapped 10-32, ANSI/EIA 310-D Universal Spaced.

B. Relay Rack
   1. Drawing Reference(s).
      a. R15.
      b. R15S.
   2. Construction.
      a. Two wide vertical side channels tapped with EIA mounting holes on both sides, 3” EIA channel construction.
      b. Full 19" wide EIA Frame fits standard equipment forms - assemblies with non-standard opening widths not permitted.
      c. Two (2) Base Angles.
      d. Two (2) Top angles.
      e. 7 ft Tall.
      f. 44 EIA Rack Units minimum.
      g. Horizontal and vertical cable management unless otherwise indicated on plans.
   3. Manufacturers:
      a. CPI 46353-703
      b. Or equal.

C. Equipment Rack, Zone 4, Front, Rear and Side Access.
   1. Drawing References: R22.
   2. Construction:
      a. Manufacturer tested Zone 4 assembly, rated for at least 900 pounds of uniformly distributed load.
      b. Vertical Height (Min): 44RU.
      c. Depth: 36" minimum.
      d. No front or rear door.
      e. Fully Adjustable 19" Mounting Rails, DIN Slot on EIA spacing standard.
      f. Full height receptacle strip, at least two (2) circuits, 20A, unless otherwise noted, as specified in Section 17126.
      g. Provide each rack with the following accessory shelves:
         i. One (1) Exhaust Fan Panel, top or rear doors, at least 200 CFM.
      h. Gangable. Racks have been designed such that they are suitable for installation either as a single, standalone unit, or in a row of identical racks (gangable).

i. Single rack installation. Provide side panels at both sides.
ii. Multirack installation in a row. Bolt racks together using means provided by manufacturer. Omit side panels except at ends of row of racks - provide at ends of rows of racks.

3. Manufacturers. Provide manufacturer's accessories or 3rd party accessories as specified elsewhere in this Section for other specified elements. Coordinate selected shelves, fans and similar with rack submitted for finish and mounting means:
   a. Middle Atlantic/DataTel MRK4436PRO with MRK-Z4 Base angles, MW4QFT-FC top w/4 fans.
   b. Or equal.

2.3 RACK PANELS AND ACCESSORIES

A. Rack Mounting Screws:
   1. Screws 10-32; length as required for at least 1/4" excess when fully seated; oval head with black plastic non marring cup washer or equivalent ornamental head; nickel, cadmium or black plated; Phillips, Allen Hex, Square- Tip or Torx drive. Slotted screws are not acceptable.

PART 3 EXECUTION

3.1 MOUNTING

A. Unless otherwise noted, all floor supported equipment racks shall be bolted to the structure in accordance with the requirements of the CBC, the UBC and the contractors approved structural engineering submittal demonstrating the method to be used to conform to these requirements.
B. Rows of identical racks shall be bolted together, in addition to being bolted to the floor, and bonded to form a single electrical ground plane.
C. Wall mounted equipment racks and cabinets shall similarly be bolted to structural members in accordance with the requirements of the CBC, the UBC and the contractors approved structural engineering submittal demonstrating the method to be used to conform to these requirements.

3.2 EQUIPMENT ENCLOSURE (RACK) AND EQUIPMENT BACKBOARD FABRICATION

A. Combustible material, other than incidental trim of indicated equipment, is prohibited within equipment racks.
B. Provide permanent labels for all equipment and devices.
C. Floor racks to be bolted floor unless otherwise indicated.
D. Access shall not require demounting or de-energizing of equipment. Install access covers, hinged panels, or pull-out drawers to insure complete access to terminals and interior components.
E. Provide a permanent label on the front of each equipment rack including the rack designation, and the circuit breaker number and associated electrical distribution panel designation servicing same.
F. Where wiring of mixed types are called for on the plans, maintain separation of wiring classifications as specified in the individual sections of the Communications

Work. Separately dress, route and land microphone, audio line level and data cables and related on the right side of the equipment enclosure, as viewed from the rear; dress, route, and land loudspeaker level, data and control cables on the left side of the equipment enclosure, as viewed from the rear.

G. Provide vertical wire management of cabling within the rack independent of the adjustable EIA mounting rails. Vertical wiring management provided by the contractor within the rack shall not prevent such rails from being moved as required by the Owner.

H. Dress and support cabling at a minimum of 24 inch on center.

I. Access shall not require demounting or de-energizing of equipment or cabling. Install access covers, hinged panels, or pull-out drawers to insure complete access to terminals and interior components.

J. Fasten removable covers containing any wired component with a continuous hinge along one side, with associated wiring secured and dressed to provide an adequate service loop. Provide an appropriate stop locks to hold all hinged panels and drawers in a serviceable position.

K. Provide permanent labels for all equipment and devices. Where possible, fasten such labels to the rack frame or to blank or vent panels which will remain in place when active equipment is removed for possible service.

L. At audio and video jack fields, provide service loop to permit removal of jack fields from rack sufficient to conveniently access all jack contacts for routine cleaning and maintenance. Organize the service loop and harness such that reasonable reconnection of jacks and jack normals is possible without cutting apart the harness.

M. Coordinate the design and execution of wire harnessing of multi-bay audio and video rack ensembles with conditions of delivery to installation locations at Project Site, and with the requirement herein for test of the completely wired system in the shop prior to delivery to the Project Site. Organize the wiring harnesses such that they will fold within one shippable unit without risk of damage, or provide polarized multi-pin connectors and related interconnect systems as specified elsewhere herein.

3.3 SIGNAL GROUNDING & BONDING PROCEDURES

A. Comply with National Electrical Code and the California Electric Code. Bond equipment racks to ground in accordance with the California Electric Code and ANSI/EIA/TIA 607 and Section 17026.

B. Unless otherwise noted maintain a unipoint ground scheme.

C. Equipment enclosures shall not be permitted to touch each other unless bolted together and electrically bonded.

END OF SECTION

SECTION 17119
COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This Section defines material standards for:
   1. Copper Termination Assemblies, including:
      a. Rack and cabinet mounted copper patch panels.
      b. Backboard, rack and cabinet mounted terminal blocks.
   2. Fiber Termination Assemblies, including:
      a. Fiber connectors.
      b. Rack and cabinet mounted fiber patch panels.
      c. Backboard mounted fiber terminal boxes.
   3. Hybrid Copper/Fiber Termination Assemblies.

1.2 RELATED WORK UNDER OTHER SECTIONS

A. Section 17010 – Common Work Results for Communications.
B. Section 17026 - Grounding and Bonding for Communications Systems.
C. Section 17100 - Structured Cabling, Basic Materials and Methods.
D. Section 17113 - Communications Entrance Protection.
E. Section 17116 - Communications Cabinets, Racks, Frames and Enclosures.
F. Section 17123 - Communications Cable Management.
G. Section 17130 - Communications Interior Backbone Cabling.
H. Section 17140 - Communications Outside Plant Backbone Cabling.
I. Section 17150 – Communications Horizontal Cabling.

1.3 REFERENCES

A. ELECTRONIC INDUSTRIES ALLIANCE (EIA).
   1. EIA-310-D (1992) Cabinets, Racks, Panels, and Associated Equipment (ANSI/EIA/310- D).

1.4 SUBMITTALS

A. Conform with the requirements of Section 01300 - Administrative Requirements and Section 17010 - Common Work Results for Communications.

1.5 DELIVERY, STORAGE AND HANDLING

A. Procedures: In accordance with Section 01600 - Product Requirements and Section 17100 - Structured Cabling, Basic Materials and Methods.

1.6 SEQUENCING

A. Not used.

PART 2 PRODUCTS

2.1 COPPER CABLE TERMINATION DEVICES AND RELATED

A. Category 5e Voice Termination Block.
   1. Drawing reference(s):
      a. 66TB6 6 pair

b. 66TB25 25 pair
c. 66TB50 50 pair
d. 66TB100 100 pair
e. 66TB300 300 pair
f. 66TB600 600 pair

2. General: Insulation displacement connector blocks consisting of oxygen free mechanical fastening system arranged in a flame-retardant molded plastic fastened to a mounting bracket.
3. Features/Functions:
   a. "66" type terminals.
4. Construction/Implementation.
   a. Provide complete with stand-off mounting bracket.
   b. Provide cable management D-rings at the bottom of and between each column of blocks.
5. Manufacturer:
   a. Siemon S66M1-50
   b. Or equal.

B. Category 5e Voice Termination Block with Pre-wired RJ21X (50 Pin) connector.
1. Drawing reference(s):
   a. 66PWTB100 100 pair
   b. 66PWTB200 200 pair
   c. 66PWTB300 300 pair
   d. 66PWTB600 600 pair
2. Features/Functions:
   a. 66 type terminal block with pre-wired RJ21X connector for 25 pairs on each side of block.
   b. Meets or exceeds Category 5e performance.
3. Manufacturers:
   a. Siemon S66M2-5W
   b. Or equal.

C. Data and Voice Icons
1. Icons shall be provided for all patch panel ports.
2. Manufacturer:
   a. Icons for Patch Panel A shall be ORANGE, Ortronics P/N OR-40323200 (package of 100) or equal.
   b. Icons for Patch Panel B shall be ORANGE, Ortronics P/N OR-40323200 (package of 100) or equal.
   c. Icons for Patch Panel C shall be ORANGE, Ortronics P/N OR-40323200 (package of 100) or equal.
   d. Icons for Patch Panel D shall be BLUE, Ortronics P/N OR-40326100 (package of 100) or equal.

D. Category 6 Data and Voice Patch Panels, Rack Mounted.
1. This section applies to patch panels used to distribute BOTH data and voice connections. See paragraph 2.1.E for specifications for patch panels used to distribute voice only

2. Drawing Reference: ***C6PP, where *** refers to port count.
3. Functions/Features:
    a. Shall meet or exceed the current TIA/EIA 568-B.1, B.2 and proposed ISO/IEC 11801-B defined ohm copper cable channel specifications.
    b. 19" EIA rack mountable.
    c. 24 ports per EIA rack unit (1.75").
    d. Arranged in groups of six (6) ports on steel panel.
    e. Ports shall be factory numbered, 1 through 96, 1 through 48, and 1 through 24
    f. Jacks on front.
    g. Terminations on rear.
    h. Holder for port identifier designation strips on front.
    i. Integral cable management bar at rear.
4. Manufacturer:
    a. Ortronics Clarity Category 6 96-port, 8-position, 8-conductor, high-density modular to 110 patch panel, P/N OR-PHD66U96.
    b. Ortronics Clarity Category 6 48-port, 8-position, 8-conductor, high-density modular to 110 patch panel, P/N OR-PHD66U48.
    c. Ortronics Clarity Category 6 24-port, 8-position, 8-conductor, high-density modular to 110 patch panel, P/N OR-PHD66U24.
    d. Or equal.

E. Category 5e Voice Patch Panels, Rack Mounted.
1. This section applies to patch panels used to distribute voice connections ONLY. See paragraph 2.1.D for specifications for patch panels used to distribute data and voice connections.
2. Drawing Reference: ***C5ePP, where *** refers to port count.
3. Functions/Features:
    a. Shall meet or exceed the current TIA/EIA 568-B.1, B.2 and proposed ISO/IEC 11801-B defined ohm copper cable channel specifications.
    b. 19" EIA rack mountable.
    c. 24 ports per EIA rack unit (1.75").
    d. Arranged in groups of six (6) ports on steel panel.
    e. Ports shall be factory numbered, 1 through 96, 1 through 48, and 1 through 24
    f. Jacks on front.
    g. Terminations on rear.
    h. Holder for port identifier designation strips on front.
    i. Integral cable management bar at rear.
4. Manufacturer:
    a. Ortronics Clarity Category 5e 96-port, 8-position, 8-conductor, high-density modular to 110 patch panel, P/N OR-PHD5E6U96.
    b. Ortronics Clarity Category 5e 48-port, 8-position, 8-conductor, high-density modular to 110 patch panel, P/N OR-PHD5E6U48.

c. Ortronics Clarity Category 5e 24-port, 8-position, 8-conductor, high-density modular to 110 patch panel, P/N OR-PHD5E6U24.
d. Or equal.

F. Voice Termination Frames
1. All voice backbone termination blocks and stand-off brackets shall be mounted on an approved termination frame unless otherwise specified on the drawings.
a. Homaco 200-pair voice termination frame P/N 50M-201-R19 Wall/Rack Module.
b. Homaco 400-pair voice termination frame P/N 50M-201-D19 Wall/Rack Module.
c. Homaco 600-pair voice termination frames P/N 50M-201-T19 Wall/Rack Module.
d. Or equal.

2.2 FIBER CABLE TERMINATION DEVICES AND RELATED

A. Fiber Optic Connectors and Related:
1. General.
a. Connectors to comply with:
i. EIA/TIA-4750000-C.
ii. EIA/TIA-604-3A.
2. Connectors:
a. SC, unless otherwise noted or scheduled.
b. Connector performance per TIA/EIA – 568B.3 and the following:
i. Insertion Loss:
(1) Multimode:
a. Less than or equal to 0.75 dB per mated pair.
(2) Single mode, UPC
a. Less than or equal to 0.75 dB per mated pair.
(3) Single mode, APC
a. Less than or equal to 0.30 dB per mated pair.
ii. Return Loss:
(1) Single mode, Ultra Polish, greater than or equal to 55 dB.
(2) Single mode, Angled Physical Contact, greater than or equal to 65 dB.
iii. Manufacturer:
(1) Connector.
a. Berk-Tek/Nexans
b. Or equal.

B. Fiber Optic Pigtails, Fusion Splicing
1. Fiber optic terminations shall be performed using fusion spliced factory pigtails with SC connectors unless otherwise specified on the drawings.
2. Pigtails for fusion spliced terminations of 50/125 micron multimode fiber:

a. Manufacturer:
   i. 1-fiber pigtails 2 meter, SC connector, Ortronics P/N OR-626PF9FR-FZ002M or equal.
   ii. 6-fiber pigtails 2 meter, SC connector, Ortronics P/N OR-626SF4ZR-FZ002M or equal.
   iii. 12-fiber pigtails 2 meter, SC connector, Ortronics P/N OR-626TF4ZR-FZ002M or equal.

3. Pigtails for fusion spliced terminations of 8.3/125 micron singlemode fiber:
   a. Manufacturer:
      i. 1-fiber pigtails 2 meter, SC connector, Ortronics P/N OR-626PC9FR-RZ002M or equal.
      ii. 6-fiber pigtails 2 meter, SC connector, Ortronics P/N OR-626SC4ZR-RZ002M or equal.
      iii. 12-fiber pigtails 2 meter, SC connector, Ortronics P/N OR-626TC4ZR-RZ002M or equal.

C. Heat Shrink Sleeves
1. All splices shall utilize heat shrink sleeves for splice protection.
   a. 60 mm heat shrink sleeves shall be used in all 12 inch splice trays.
   b. 40 mm heat shrink sleeves are acceptable in 6 inch splice trays where 60 mm heat shrink sleeves either will not fit or are not recommended by the splice tray manufacturer.
   c. Manufacturer:
      i. Heat shrink sleeves for splices in surface mount fiber patch/splice cabinets Ortronics P/N OR-20500043 or equal.
      ii. Heat shrink sleeves for splices in rack mount fiber splice cabinets Ortronics P/N OR-20500130 or equal.

D. Splice Trays
1. All finished splices (with heat shrink sleeve in place) shall be mounted and stored within splice trays compatible with the splice enclosure being used. All slack in 250- and 900-micron coated fibers shall be carefully coiled and stored inside the tray.
2. Manufacturer:
   a. Splice trays for fusion splices in surface mount fiber patch/splice enclosures Ortronics P/N OR-62600003 or equal.
   b. Splice trays for fusion splices in rack mount fiber splice enclosures Ortronics P/N OR-61500016 or equal.

E. Fiber Optic Adapter Panels
1. Manufacturer:
   a. Adapter panels for multi mode fiber terminations in surface mount or rack mount patch or patch/splice cabinets 6-SC duplex (12 fibers), metal adapters, phosphor-bronze alignment sleeves, Ortronics P/N OR-615SCDSM6 or equal.
   b. Adapter panels for single mode fiber terminations in surface mount or rack mount patch or patch/splice cabinets 6-SC duplex (12 fibers),

blue adapters, ceramic alignment sleeves, Ortronics P/N OR-615SCDSM6C or equal.

F. Fiber Patch Enclosure, Wall Mount
   1. Drawing Reference: ***FPEW, where *** refers to the fiber patch panel count.
   2. Features/Functions:
      a. Provides a location for packaging fiber optic cables with direct terminations.
      b. Two compartments, separated by a partition loaded with fiber optic adapter panels.
         i. Left side typically for storing incoming cable slack and connecting terminated fibers.
         ii. Right side typically for patching rack-mounted network equipment.
      c. Suitable for indoor use.
      d. Constructed of 0.125 inch minimum thick aluminum or powder coated steel.
      e. Cable can be inserted/removed laterally via removable mending plate or similar.
      f. Interior cable storage rings or spools.
      g. Tamper-proof hardware - separate locking sections for cable terminations and patch panel access.
      h. Provides strain relief for entrance cables.
   3. Manufacturer:
      a. Patch enclosures for up to 24 fibers Ortronics P/N OR-615SMFC-LX-12P or equal.
      b. Patch enclosures for up to 48 fibers Ortronics P/N OR-615SMFC-24P or equal.
      c. Patch enclosures for up to 96 fibers Ortronics P/N OR-615SMFC-48P or equal.

G. Fiber Patch/Splice Enclosure, Wall Mount
   1. Drawing Reference: ***FPSEW, where *** refers to the fiber patch panel count.
   2. Features/Functions:
      a. Provides a location for splicing and packaging fiber optic cables.
      b. Two compartments, separated by a partition loaded with fiber optic adapter panels.
         i. Left side typically for storing incoming cable slack and splice trays and connecting terminated fibers.
         ii. Right side typically for patching rack-mounted network equipment.
      c. Suitable for indoor use.
      d. Constructed of 0.125 inch minimum thick aluminum or powder coated steel.

e. Cable can be inserted/removed laterally via removable mending plate or similar.
f. Interior cable storage rings or spools.
g. Threaded stud or similar anchoring point for stacking and securing splice trays.
h. Tamper-proof hardware - separate locking sections for cable terminations and patch panel access.
i. Provides strain relief for entrance cables.

3. Manufacturer:
a. Patch/splice enclosures for up to 48 fibers Ortronics P/N OR-615SMFC-24P/S or equal.
b. Patch/splice enclosures for up to 96 fibers Ortronics P/N OR-615SMFC-48P/S or equal.

H. Fiber Patch Enclosure, Rack Mount
1. Drawing Reference: ***FPER, where *** refers to the fiber patch panel count.
2. Features/Functions:
a. 19" EIA rack mount.
b. Provides a location for packaging fiber optic cables with direct terminations.
c. Two compartments, separated by a partition loaded with fiber optic adapter panels.
i. Rear (larger) side typically for storing incoming cable slack and connecting terminated fibers.
ii. Front (smaller) side typically for patching rack-mounted network equipment.
d. Suitable for indoor use.
e. Constructed of 0.125 inch minimum thick aluminum or powder coated steel.
f. Cable can be inserted/removed laterally via removable mending plate or similar.
g. Interior cable storage rings or spools.
h. Tamper-proof hardware - separate locking sections for cable terminations and patch panel access.
i. Provides strain relief for entrance cables.
j. Suitable for reentry, if required for future maintenance or modification, without damage to the cable or terminated fibers.
3. Manufacturer:
a. Patch enclosures for up to 36 fibers Ortronics P/N OR-615MMC-18P-00 or equal.
b. Patch enclosures for up to 72 fibers Ortronics P/N OR-615MMC-36P-00 or equal.
c. Patch enclosures for up to 144 fibers Ortronics P/N OR-615MMC-72P-00 or equal.

I. Fiber Splice Enclosure, Rack Mount

1. Drawing Reference: ***FSER, where *** refers to the fiber splice count.
2. Features/Functions:
   a. 19" EIA rack mount.
   b. Provides a location for packaging fusion spliced fiber optic cables.
   c. Suitable for indoor use.
   d. Constructed of 0.125 inch minimum thick aluminum or powder coated steel.
   e. Interior cable storage rings or spools.
   f. Provides strain relief for entrance cables.
   g. Integral threaded stud or steel wire frame for organizing and securing splice trays
   h. Suitable for reentry, if required for future maintenance or modification, without damage to the cable or terminated fibers.
3. Manufacturer:
   a. Splice enclosures for up to 48 fibers Ortronics P/N OR-615MMC-48S-00 or equal.
   b. Splice enclosures for up to 96 fibers Ortronics P/N OR-615MMC-96S-00 or equal.

PART 3 EXECUTION

3.1 **Refer to Section 17130 - Communications Indoor Backbone Cabling for Requirements for termination of Riser and Outside Plant Cabling Within EFs And BDFs.**

3.2 **Refer to Section 17100 – Structured Cabling, Basic Materials And Methods.**

3.3 **Refer to Section 17150 – Communications Horizontal Cabling.**

END OF SECTION

SECTION 17123
COMMUNICATIONS CABLE MANAGEMENT

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Section includes provision of cable management for cabling installed under the work of this Project as well as for Owner furnished patch cords at equipment racks.

B. Scope includes:

1. Innerduct.
    a. Interior.
    b. Outside Plant.
2. Cable End Spillway.
3. Backboard Cable Management.
4. Patch Panel Cable Management at racks and cabinets.

1.2 RELATED WORK IN OTHER SECTIONS

A. Section 17033 - Conduits and Backboxes for Communications Systems.
B. Section 17036 - Cable Trays for Communications Systems.
C. Section 17039 - Surface Raceways for Communications Systems.
D. Section 17053 - Identification for Communications Systems.
E. Section 17100 - Structured Cabling, Basic Materials and Methods.
F. Section 17116 - Communications Cabinets, Racks, Frames and Enclosures.
G. Section 17119 - Communications Termination Blocks and Patch Panels.
H. Section 17150 - Communications Horizontal Cabling.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. ASTM D2239-03 Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.

B. Underwriters Laboratories (UL).

1. UL 910 Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables used in Spaces Transporting Environmental Air (Nov. 1998).

1.4 SUBMITTALS

A. Conform with the requirements of Section 01300 - Administrative Requirements and Section 17010 - Common Work Results for Communications.

1.5 DELIVERY, STORAGE AND HANDLING

A. Procedures: In accordance with Section 01600 - Product Requirements and Section 17100 - Structured Cab ling, Basic Materials and Methods.

1.6 SEQUENCING

A. Not used.

PART 2 PRODUCTS

2.1 CONDUIT CABLE MANAGEMENT

A. Conduit End Waterfall Spillway.
   1. Drawing Reference: CEW.
   2. Features/Functions:
      a. Spillway fastens to end of EMT conduit, provides radius sweep, open on top, solid from below.
      b. Maintains proper bend radii for fiber/cable.
      c. Provides tie points for fire pillow retention.
      d. Supports up to 100 lbs. of hanging fiber/cable.
      e. Clamp for securing to EMT.
      f. Self-fastening tie down system for supporting cabling.
   3. Construction:
      a. Fire Retardant ABS.
   4. Manufacturers:
      a. Bejed BJ-2049 Spillway.
      b. Or equal (no known equal).

2.2 HORIZONTAL PATCH PANEL CABLE MANAGEMENT

A. Patch Panel Cable Management, Rack Mounted, Snap Cover.
   1. Drawing References:
      a. 1 RU: RMWM1C
      b. 2 RU: RMWM2C
      c. 3 RU: RMWM3C
   2. Construction.
      a. EIA 19 or 23" Rack Mount, as required.
      b. Continuous flexible system of fingers and slots.
      c. De-burred to avoid snagging patch cord jacket.
      d. Snap Cover.
   3. Manufacturer, EIA 19” rack mount:
      a. 1 RU CPI 30139-719 or equal.
      b. 2 RU CPI 30130-719 or equal.
      c. 3 RU CPI 30131-719 or equal.
   4. Manufacturer, EIA 23” rack mount:
      a. 1 RU CPI 30139-723 or equal.
      b. 2 RU CPI 30130-723 or equal.
      c. 3 RU CPI 30131-723 or equal.

2.3 VERTICAL CABLE MANAGEMENT

A. Cable Management, Vertical, latches.
   1. Drawing References:
      a. Single-Sided Narrow: VCMSSNC
      b. Single-Sided Wide: VCMSSWC
      c. Double-Sided Narrow: VCMDSNC
      d. Double-Sided Wide: VCMDCWC
   2. Construction.
      a. Bolts to racks specified in Section 17116.
      b. De-burred and supplied with protective edge guards to avoid snagging patch cord jacket.

c. System of latches to retain cables.
d. Manufacturer:
i. Single-Sided Narrow CPI 11730-703 or equal.
ii. Single-Sided Wide CPI 11374-703 or equal.
iii. Double-Sided Narrow CPI 12096-703 or equal.
iv. Double-Sided Wide CPI 11729-703 or equal.

2.4 BACKBOARD CABLE MANAGEMENT

A. Fiber Management Ring, Preformed Loop.
1. Drawing Reference: FMR
2. Construction:
a. 24 inch diameter steel ring stores fiber slack using Velco fasteners at regular intervals around ring.
b. Screw fastens to backboard at BDF or IDF.
3. Manufacturer:
a. Leviton 48900-0FR.
b. Or equal (no known equal).

B. Wire Management Rings, Wall/Ceiling Mounted:
1. Drawing References/Functions Features:
a. WMRB - Bridle Ring Type, Threaded Lag Screw.
b. WMRC - Closed Ring, U shaped assembly with two screw holes at ends.
c. WMRO - Open, Re-enterable Split Ring permitting cables to be inserted midspan, two screw holes at ends.
d. WMP** - Steel back board with 4 inch deep min, 8 inch wide vertical wire management rings, front enterable. Provide trough at bottom of each column of WMP.
e. WMP**T - Narrow, steel back board with 4 inch deep min, 3 inch wide vertical wire management rings, front enterable.
2. Provide as required to support indicated cable bundle and location.
3. Provide type WMRB at wood frame construction for cable hung from underside of ceiling, unless otherwise noted.
4. Manufacturers:
a. WMRB:
i. B-Line Fasteners, BR Series.
ii. Senior Industries.
iii. T&B
iv. Or equal.
b. WMRC:
i. AllenTel
ii. Chatworth Products Wall Mount Closed D Ring.
iii. Senior Industries.
iv. Or equal.
c. WMRO:
i. AllenTel.
ii. Chatworth Products Wall Mount Open Ring.

iii. Commscope/Systimax, Inc.
iv. Siemon.
v. Or equal.

d. WMP:
i. Siemon S188-*** to match adjacent terminal blocks with S188-WD.
ii. Ortronics OR-806003194 or OR-806003196 to match terminal blocks.
iii. By any manufacturer listed for 110TB under Section 17119 – Communications Termination Blocks and Patch Panels.
iv. Or equal.

e. WMP**T:
i. Siemon SI10M-WM-*** to match adjacent terminal blocks.
ii. By any manufacturer of listed for 110TB under Section 17119Communications Termination Blocks and Patch Panels.
iii. Or equal.

PART 3 EXECUTION

3.1 GENERAL

A. Refer to Section 17130 Communications Indoor Backbone Cabling for requirements for cable routing within IDF's, and BDF's.

3.2 INNERDUCT INSTALLATION

A. Schedule of Application.
1. Underground.
a. At 4" ducts and inside maintenance holes and vaults, place fiber cabling and 50 pair and smaller copper telephone cabling inside WMID.
b. Omit WMID at conduits smaller than 4”.
c. At tray conditions in utility tunnel and at backboard, cable runway and tray conditions at communications closets, protect fiber cabling with ID Innerduct.
d. Retention/Sealing of ducts at conduit entrances.
2. At plenum tray conditions, provide IDP.
3. At 4" and larger interior conduits, provide WMID. Provide plenum rated WMID at plenum ceiling conditions.

3.3 CONDUIT END WATERFALL

A. Fasten securely to conduit end wherever cabling will exit conduit 18" or more above the cable tray to prevent damage due to cabling due to weight of cable bearing on a conduit end.
B. Secure cabling with integral cable restraint system.

END OF SECTION

SECTION 17126
COMMUNICATIONS RACK MOUNTED POWER PROTECTION AND POWER STRIPS

PART 1 GENERAL

1.1 SCOPE OF WORK
A. Section includes provision of power strips at racks and cabinets installed under the work of this Project.

1.2 RELATED WORK IN OTHER SECTIONS
A. Section 17116 - Communications Cabinets, Racks, Frames and Enclosures.

1.3 REFERENCES
A. ELECTRONIC INDUSTRIES ALLIANCE (EIA).
   1. EIA-31 0-D (l992) Cabinets, Racks, Panels, and Associated Equipment (ANSIIEIA/31 0- D).

1.4 SUBMITTALS
A. Conform with the requirements of Section 01300 - Administrative Requirements and Section 17010 - Common Work Results for Communications.

1.5 DELIVERY, STORAGE AND HANDLING
A. Procedures: In accordance with Section 01600 - Product Requirements and Section 17100 - Structured Cabling, Basic Materials and Methods.

1.6 SEQUENCING
A. Not used.

PART 2 PRODUCTS

2.1 EQUIPMENT ENCLOSURE PWER, PROTECTION AND SIGNAL GROUNDING
A. Comply with applicable Codes. Provide UL Listed devices suitable for commercial use. Provide all junction boxes, raceway, fittings, wire, supports and fastenings as required for complete installation. Unless otherwise noted, provide receptacles of NEMA 5-15R configuration.

B. Full Height Receptacle Strip, One (1) Circuit, 15A.
   1. Features/Construction:
      a. Not less than 70" Long.
      b. Not less than eleven (11) 15A receptacles.
      c. Integral circuit breaker.
      d. NEMA 5-15P plug on 6' cord.
      e. UL Listed Assembly.
      f. Provide mounting hardware as necessary to attach to rack interior.
   2. Manufacturers:
      a. Middle Atlantic/Datatel.
      b. Or equal.

C. Full Height Receptacle Strip, One (1) Circuit, 20A.

1. Features/Construction:
   a. Not less than 70" Long.
   b. Not less than eleven (11) 15A receptacles.
   c. Integral circuit breaker.
   d. NEMA 5-20P plug on 6' cord.
   e. UL Listed Assembly.
   f. Provide mounting hardware as necessary to attach to rack interior.
2. Manufacturers:
   a. Midde Atlantic PD-1020C-NS.
   b. Or equal.

PART 3 EXECUTION

3.1 CONFORM WITH THE REQUIREMENTS OF SECTION 17116 AND THE FOLLOWING

A. Mounting:
   1. Mechanically fasten strips to the rack/cabinet being served using strip or rack being served.
   2. Mount strip so that it does not impede user access to:
      a. Vertical wire management integral to the racks.
      b. Front and rear movement of adjustable EIA mounting rails supplied with the rack or cabinet.
      c. Mounting of Owner furnished EIA rack mountable equipment within the served rack.
   3. Unless otherwise noted, the strip to be mounted to derive power from electrical receptacles mounted to the cable tray above the rack or drop box receptacles beneath the floor. Mount strip so that the power cord reaches the provided receptacles without:
      a. Causing tension on the power cord.
      b. Putting it in direct contact with signal cabling.
      c. Putting it in contact with sharp edges.
      d. Lacing it to parts intended to be movable, including, but not limited to:
         i. Slide out drawers and shelving.
         ii. Rack mounted for Owner furnished servers on pullout rails.
         iii. EIA adjustable mounting rails.

END OF SECTION

SECTION 17130
COMMUNICATIONS INDOOR BACKBONE CABLING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Work of this Section includes:
   1. Indoor Copper Backbone Cabling between Communications Rooms and communications terminal nodes other than station cabling.
   2. Indoor Optical Fiber Backbone Cabling between Communications Rooms and communications terminal nodes other than station cabling.
   3. Terminate fiber on patch panels as specified in Section 17119.
   4. Terminate copper cabling on terminal blocks as specified in Section 17119. Provide terminal block, high pair count copper connector cabling and rack mounted patch panels to permit Owner's telephone contractor to cross connect the entrance and riser cabling to individual station ports using Owner furnished patch cords.
   5. For all cabling:
      a. Test cabling to demonstrate performance to specified standards or better using test equipment and methods as specified in Section 17100.
      b. Label cables, jacks, plates and patch panels as specified in Section 17053.
      c. Document on Record Documents as described in Section 17010.

B. Related work in other Sections.
   1. Section 17026 - Grounding and Bonding for Communications Systems.
   2. Section 17029 - Hangers and Supports for Communications Systems.
   3. Section 17033 - Conduits and Backboxes for Communications Systems.
   4. Section 17036 - Cable Trays for Communications Systems.
   5. Section 17053 - Identification for Communications Systems.
   6. Section 17100 - Structured Cabling, Basic Materials and Methods.
   7. Section 17116 - Communications Cabinets, Racks, Frames and Enclosures.
   8. Section 17119 - Communications Termination Blocks and Patch Panels.
   9. Section 17123 - Communications Cable Management.
   10. Section 17126 - Communications Rack Mounted Power Protection and Power Strips.
   11. Section 17150 - Communications Horizontal Cabling.

1.2 REERENCES

A. Refer to Section 17100 - Structured Cabling, Basic Materials and Methods.

1.3 SUBMITTALS

A. Conform to the requirements of Section 01300 - Administrative Requirements and Section 17010 - Common Work Results for Communications.

1.4 DELIVERY, STORAGE AND HANDLING

A. Procedures: In accordance with Section 01600 - Product Requirements and Section 17100 - Structured Cabling, Basic Materials and Methods.

1.5 SEQUENCING

A. Not used.

PART 2 PRODUCTS

2.1 COPPER BACKBONE CABLING

A. General:
   1. Each conductor shall be a minimum of 22 or 24 AWG.
   2. Complies with:
      a. ICEA S-90-661.
      b. EIA TIA/EIA-568-B.1.
      c. EIA TIA/EIA-568-B.2.
      d. NEMA WC 63.1
      e. UL444.
   3. Solid conductor 100 ohm multipair UTP (Unshielded twisted pair), formed into 25 pair binder groups covered with a gray thermoplastic jacket.
   4. Imprinted with:
      a. Manufacturers name or identifier.
      b. Flammability rating.
      c. Gauge of conductor.
      d. Transmission performance rating (category designation).
      e. At regular intervals not to exceed 2 feet.
   5. The word "FEET" or the abbreviation "FT" shall appear after each length marking.
   6. Provide communications general purpose (CM or CMG), communications plenum (CMP) or communications riser (CMR) rated cabling in accordance with NFPA 70.
      a. Type CMP and CMR may be substituted for type CM or CMG and type CMP may be substituted for type CMR in accordance with NFPA 70.
      b. Meets EIA/TIA Category 3.
      c. USOC color code.
      d. NEC Type CM or CMG.
   7. Color coding shall comply with industry standards for 25 pair cables.

B. Inside Distribution Wire, Horizontal.
   1. Drawing Reference ** pro T-IDW, where ** refers to required pair count.
   2. Construction:
      a. 2 to 600 pair count voice pair cabling in overall jacket.
      b. Meets EIA/TIA Category.
      c. USOC color code.
      d. NEC Type CM or CMG.
      e. Nominal Outside Diameter, not to exceed the following:
      f.

Pair County	Outside Diameter (inches)
6 pr.	0.23
12 pr.	0.25
25 pr.	0.34
50 pr.	0.47
100 pr.	0.64
200 pr.	0.97
300 pr.	1.07
400 pr.	1.30
600 pr.	1.50

3. Manufacturer:
   a. Superior/Essex.
   b. General Cable.
   c. Or equal.

C. Inside Distribution Wire, Riser.
1. Drawing Reference ** pr. T-IDW-R, where ** refers to required pair count.
2. Construction:
   a. 25 to 600 pair count voice pair cabling in overall jacket.
   b. PVC jacket.
   c. USOC color code.
   d. NEC Type CMR.
   e. Meets EIA/TIA Category 3.
   f. Nominal Outside Diameter, not to exceed the following:

Pair Count	**Outside Diameter, not to exceed the following**:
25 pr.	0.54
50 pr.	0.70
100 pr.	0.86
200 pr.	1.20
300 pr.	1.30
400 pr.	1.50
600 pr.	1.90

3. Manufacturer:
   a. Superior/Essex.
   b. General Cable.
   c. Or equal.

D. Inside Distribution Wire, Plenum.
1. Drawing Reference ** pro T-IDW-P, where ** refers to required pair count.
2. Construction:
   a. 25 to 600 pair count voice pair cabling in overall jacket.
   b. Plenum rated jacket.
   c. USOC color code.
   d. NEC Type CMP.
   e. Meets EIA/TIA Category 3.
   f. Nominal Outside Diameter, not to exceed the following:

Pair Count	**Outside Diameter (inches)**

25 pr.	0.54
50 pr.	0.70
100 pr.	0.86
200 pr.	1.20
300 pr.	1.30
400 pr.	1.50
600 pr.	1.90

3. Manufacturer:
   a. Superior/Essex.
   b. General Cable.
   c. Or equal.

2.2 FIBER OPTIC COMMUNICATIONS CABLING AND RELATED

A. General Requirements:

1. Fiber count per cable to comply with minimum counts indicated on the plans. Plans indicate specific cable counts providing quantities of multimode and single mode fiber strands.
2. Quantities are minimum quantities. At Contractor's option, provide a greater number. Where a greater number are provided, terminate, test, label and document all strands on fiber patch panels and/or terminal boxes as indicated as if quantity provided were called out for on the plans.
3. Where contract documents call for individual single mode and multimode cables, Contractor may substitute a hybrid cable with the same or greater strand count of each type.
4. Comply with applicable Code for insulation, jacket, marking and listing for applicable use.
   a. Provide nonconductive optical fiber general purpose cable (OFN or OFNG), nonconductive optical fiber plenum cable (OFNP), and nonconductive optical fiber riser cable (OFNR) rated cable in accordance with NFPA 70 and UL 910.
   b. Type OFNP or OFNR may be substituted for type OFN or OFNG and type OFNP may be substituted for type OFNR in accordance with NFPA 70.
5. Fiber media shall, at minimum, meet the following performance standards:
   a. ANSI/EIA/TIA 568-B.l.
   b. ANSI/EIA/TIA 568-B.3.
6. Fiber media shall, at minimum, meet the following construction standards:
   a. ICEA S-87-640.
   b. ICEA S-83-596.
   c. All dielectric, unless otherwise noted.
7. The cable cordage jacket, fiber, unit, and group color shall be in accordance with EIA TIAIEIA-598-B.
   a. Colors shall be across specified storage/installation temperature range.
   b. Means of providing conforming colors shall not degrade performance of cable.

8. Jacket:
    a. Free of splits, holes or blisters.
    b. Marked and listed in conformance with California Electric Code 770.
    c. Conform with:
        i. UL 1666 and
        ii. NFPA 70.
    d. Heavy duty construction, Fiberglass Epoxy Rod/Kevlar strength member(s).
    e. Each fiber to be 100% attenuation tested by the Manufacturer prior to shipping. Manufacturer's test to be affixed to shipping reel.
    f. Cable shall be imprinted with fiber count, fiber type and aggregate length at regular intervals not to exceed 40 inches. Hybrid fiber optic cable marking shall comply with EIA TIAIEIA-598-B.
9. Performance:
    a. Temperature Sensitivity:
        i. Storage: -40C degrees to +70C degrees.
        ii. Installation: -30C degrees to +70C degrees.
    b. Variance:
        i. Multimode.
    c. Specified attenuation is maximum allowed over entire operating range of cable.
        i. Single mode:
            (1) Average change, not more than 0.05 dB/km at 1550 -40C degrees to +70C degrees.
        ii. Maximum change not more than 0.15 dB/km at 1550 nm.

B. Fiber, Multimode - General.
1. Meeting EIA/TIA 568B.3 and EIA TIAIEIA-492AAAB, multimode, 50/125-urn diameter, 0.275 numerical aperture.
2. Construction:
    a. Multimode fiber strands.
    b. Core Diameter: 50.0 +/- 3.0µm per TIA/EIA -455-176.
    c. Cladding Diameter: 125 +/- 2.0 /µm per TIA/EIA-455-176.
    d. Numerical Aperture:0.200 +/- 0.015 per TIA/EIA-455-177.
    e. Core to Cladding Offset ≤ 3.0 /µm.
    f. Coating Diameter: 245 +/- 10 /µm per TIA/EIA-455-173 or 163.
    g. Core and Cladding Non-Circularity.
    h. Core: ≤ 5.0% per TIA/EIA -455-176.
    i. Cladding: ≤ 2.0% per TIA/EIA-455-176.
    j. Graded Index.
    k. Effective Group Index of refraction:
        i. 1.49 at 850 nm.
        ii. 1.49 at 1300 nm.
    l. Coating to be mechanically strippable, dual layered, UV -cured acrylate applied by the fiber manufacturer.

3. Each fiber to be 100% proof-tested by the manufacturer to sustain 100 kpsi load minimum per TIA/EIA-455-31.
4. Performance:
    a. Bandwidth:
        i. Laser source, per TIA/EIA-492AAAC and draft IEC 60793-210 for type Al a.2, ensured by DMD performance specifications for sources meeting launch conditions specified in 10 Gigabit Ethernet (IEEE 802.3ae), OIF OC-192/STM-64 VSR-4-04, and draft 10 Gigabit Fiber Channel (Tll.2 10GFC).
        (1) 850 nm: > 950 MHz at 1 km.
        (2) 1300 nm: > 500 MHz at 1km.
    b. Overfilled Launch/LED, per TIA/EIA-455-204.
        i. 850 nm: > 700 MHz at 1 km.
        ii. 1300 nm: > 500 MHz at 1km.
    c. Chromatic Dispersion:
        i. Minimum Zero Dispersion Wavelength: 1297 nm per TIA/EIA-455-168 or 175.
        ii. Maximum Zero Dispersion Wavelength: 1320 nm per TIA/EIA-455-168 or 175.
        iii. Maximum Zero Dispersion Slope: 0.101 ps/nm2ᵉkm per TIA/EIA-455-168 or 175.
    d. Differential Mode Delay (DMD), ps/m, per DMD test methods TIA/EIA-455-220 and IEC 60793-1-49.
        i. 850 nm: < .70.
        ii. 1300 nm: < .88.
    e. Attenuation:
        i. 850 nm: ≤ 3.0 dB/km.
        ii. 1300 nm: ≤ 1.0 dB/km.
        iii. Max attenuation point discontinuity: <0.25 dB at any design wavelength.
        iv. Bending Attenuation induced @ 1550 run, with 100 turns on 75mm dia mandrel:< 0.50 dB.
        v. Attenuation Difference at 1380 nm, ≤ attenuation at 1300 nm +3.0 dB/km.
        vi. Water Immersion: Induced attenuation, 23 degrees C water immersion: ≤ 0.1 dB/km.
    f. Manufacturers:
        i. Berk-Tek.
        ii. Or equal.

C. Fiber, Single Mode – General.
1. Meeting EIA/TIA 568B.3 and EIA TIA/EIA-492CAAA, single-mode, 8/125-µm diameter, 0.10 numerical aperture.
2. Construction:
    a. Single mode fiber strands.

b. Mode field diameter: 9.3 +/- 0.5 µm at 1310 nm (measured per Petermann II) 10.5 +/- 1.0µm at 1550 nm.
c. Core Diameter: 8.3µm.
d. Numerical Aperture: 0.11.
e. Cladding Diameter: 125 +/- 1.0 µm.
f. Cloating Diameter: 245 +/- 10 µm.
g. Cladding Non-Circularity: ≤ 1.0%.
h. Core to Cladding Offset: ≤ 0.8 µm.
i. Cabled Cutoff Wavelength (ccf): <1260 nm.
j. Coating to be mechanically strippable, dual layered, UV-cured acrylate applied by the fiber manufacturer.
k. Each fiber to be 100% proof-tested by the manufacturer to sustain 100 kpsi load minimum.

3. Performance:
   a. Chromatic Dispersion:
      i. Minimum Zero Dispersion Wavelength: 1301.5 run.
      ii. Maximum Zero Dispersion Wavelength: 1321.5 nm.
      iii. Maximum Zero Dispersion Slope: 0.092 ps/nm2 per km.
   b. Dispersion:
      i. ≤ 3.2 ps/(nm^{e}km) from 1285 run to 1330 nm.
      ii. < 18 ps/(nm^{e}km) at 1550 nm.
      iii. Polarization Mode Dispersion: ≤ 0.5 ps/ SQRT km.
   c. Attenuation:
      i. Point Discontinuity: ≤ 0.10 dB at 1310 nm or 1550 nm.
      ii. Water peak attenuation at 1383 +/- 3 nm: ≤ 2.1 dB/km.
      iii. Bending Attenuation induced @ 1550 nm, with 100 turns on 75mm dia mandrel < 0.10 dB.
      iv. Water Immersion: Induced attenuation, 23 degrees C water immersion: ≤ 0.05 dB/km.
   d. Manufacturer:
      i. Berk-Tek.
      ii. Or equal.

D. Fiber Optic Cable, Inside Distribution, Breakout Cable:
1. Drawing References:
   a. XX FOM-IDW Multimode, where XX indicates fiber count.
   b. XX FOS-IDW Single Mode, where XX indicates fiber count.
   c. XX FOH-IDW Hybrid, where XX indicates total fiber count. Ratio of Single mode to Multimode within overall count is 1:1, unless otherwise noted.
2. Fiber: Refer to:
   a. FIBER, MUL TIMODE, GENERAL, and
   b. FIBER, SINGLE MODE, GENERAL, as applies.
3. Application: In-building Distribution. Breakout Cable Applications.
4. Approvals: Where used outside conduit, OFN, OFNP, OFNR per NEC 770-51, as applies.

5. Construction:
   a. Refer additionally to Fiber Cable Construction, General, and elsewhere herein.
   b. Suitable and approved for indoor use.
   c. Tight buffer.
   d. At least one ripcord to facilitate sheath removal.
   e. Breakout style construction, with individual jacket per fiber with overall outside jacket.
   f. Maximum Cable Diameter:
      i. 2 Fibers: .236”
      ii. 4 Fibers: .285”
      iii. 6 Fibers: .363”
      iv. 8 Fibers: .437”
      v. 10 Fibers: .473”
      vi. 12 Fibers: .506”
   g. Performance:
      i. Maximum attenuation per EIA/TIA-455-61.
      ii. Multimode.
         (1) 850 nm: ≤ 3.5 dB/km.
         (2) 1300 nm: ≤ 1.5 dB/km.
      iii. Single mode.
         (1) 1300 nm: ≤ 1.0 dB/km.
         (2) 1550 nm: ≤ 1.0 dB/km.
   h. Minimum bend radius:
      i. During installation: 20 times cable outside diameter.
      ii. After installation: 10 times cable outside diameter.
   i. Maximum Safe Longitudinal Load:
      i. At installation:
         (1) 2 Fibers: 150lbs.
         (2) 4 Fibers: 290 lbs.
         (3) 6 Fibers: 380lbs.
         (4) 8 Fibers: 480lbs.
         (5) 10-12 Fibers: 575 lbs.
      ii. Long term application:
         (1) 2 Fibers: 25 lbs.
         (2) 4 Fibers: 90lbs.
         (3) 6 Fibers: 115 lbs.
         (4) 8 Fibers: 145lbs.
         (5) 10-12 Fibers: 75lbs.
      iii. Crush resistance: 250lb/inch.
      iv. Impact Resistance: 3.6 ft-lbs., 10 impacts.
      v. Flex, Twist/Bend 1000 cycles, 22 lbs., 10 x O.D. radius.
   j. Manufacturer, subject to above:
      i. Berk-Tek.
      ii. Or equal.

E. Fiber Optic Cable, Riser:
   1. Drawing References:
      a. XX FOM-R Multimode, where XX indicates fiber count.
      b. XX FOS-R Single mode, where XX indicates fiber count.
      c. XX FOH-R Hybrid, where XX indicates total fiber count. Ratio of Single mode to Multimode within overall count is 1:1, unless otherwise noted.
   2. Fiber: Refer to:
      a. FIBER, MUL TIMODE, GENERAL, and
      b. FIBER, SINGLE MODE, GENERAL, as applies.
   3. Application: Intra-building distribution in building risers and below building crawl space.
   4. Listing: Meeting NEC/CEC OFNR, Listing by nationally recognized testing agency.
      a. Construction:
         i. Refer additionally to Fiber Cable Construction, General, and elsewhere herein.
         ii. Jacket: Subject to listing and rating for vertical riser cable.
         iii. Tight Buffer construction only, "Core Lock" not required.
         iv. Otherwise as for FO*-OP, except for construction affecting listing.
      b. Dimensions, not to exceed the following:
         i. 1 to 4 Fibers: 0.20".
         ii. 5 to 12 Fibers: 0.28”.
         iii. 12 to 24 Fibers: 0.50”.
         iv. 25 to 60 Fibers: 0.80”.
         v. 61 to 108 Fibers: 0.90”.
         vi. 109 to 144 Fibers: 1.10”.
      c. Performance:
         i. As for FO*-OP.
      d. Manufacturer:
         i. Berk-Tek.
         ii. Or equal.

F. Fiber Optic Cable, Plenum:
   1. Drawing References:
      a. XX FOM-P Multimode, where XX indicates fiber count.
      b. XX FOS-P Single mode, where XX indicates fiber count.
      c. XX FOH-P Hybrid, where XX indicates total fiber count. Ratio of Single mode to Multimode within overall count is 1:1, unless otherwise noted.
   2. Fiber: Refer to
      a. FIBER, MULTIMODE, GENERAL, and
      b. FIBER, SINGLE MODE, GENERAL, as applies.
      c. Application: Intra-building distribution in building plenum and duct space.

3. Listing: Meeting NEC OFNP, Listing by nationally recognized testing agency.
4. Construction:
   a. Refer additionally to Fiber Cable Construction, General, and elsewhere herein.
   b. Jacket: Subject to listing and rating for plenum cable.
   c. Tight Buffer construction only, "Core Lock" not required.
   d. Otherwise as for FO*-OP, except for construction affecting listing.
5. Dimensions, not to exceed the following:
   a. 1 to 4 Fibers: 0.20".
   b. 5 to 12 Fibers: 0.28".
   c. 12 to 24 Fibers: 0.50".
   d. 25 to 60 Fibers: 0.80".
   e. 61 to 108 Fibers: 0.90".
   f. 109 to 144 Fibers: 1.10".
6. Performance:
   a. As for FO*-OP.
7. Manufacturer:
   a. Berk-Tek
   b. Or equal.

G. Fiber Optic Cable, Outside Plant, Riser and Inside, Constrained Diameter:
1. Drawing References:
   a. XX FOM-OPR Multimode, where XX indicates fiber count.
   b. XX FOS-OPR Single mode, where XX indicates fiber count.
   c. XX FOH-OPR Hybrid, where XX indicates total fiber. Ratio of Single mode to Multimode within overall count is 1:1, unless otherwise noted.
2. Fiber and Application:
   a. Inter-building and intra-building distribution in building risers, below building crawl space, manholes and site conduit.
   b. Specifically suitable for continuous splice free entry into building from OSP interior past without distance limits due to construction and/or cable diameter.
3. Listing: UL OFNR. Meeting NEC OFNR.
4. Construction:
   a. Refer additionally to Fiber able Construction, General, and elsewhere herein.
   b. Suitable and approved for wet location. Meets requirements for FO*-OP where installed in those locations.
   c. As for FO*-R with not to exceed dimensional constraint, as follows:

Fiber Count	**Overall Cable Diameter (in.)**
2	0.18
4	0.20
6	0.22
8	0.24

10	0.26
12	0.28
14	0.28
16	0.28
18	0.28
24	0.31
30	0.35
36	0.35
48	0.41
60	0.43
72	0.47
84	0.51
96	0.55
108	0.55
120	0.59
132	0.61
144	0.63
156	0.71

5. Performance:
   a. As for FO*-R.
6. Manufacturer:
   a. Berk-Tek.
   b. Or equal.

PART 3 EXECUTION

3.1 FIBER OPTIC CABLING PRACTICE

A. Service Loop.
   1. At IDF's and BDF's, at both ends of cables, provide at least 30 feet of fiber in excess of that required to reach the patch panel by a dressed route. Form into a storage loop and fix in place as directed by the Owner's Representative.
   2. At the Telecomm Building, provide at least 30 feet of fiber in excess of that required to reach the patch panel by a dressed route. Form into a storage loop and fix in place in the cable vault (outside of the machine room) as directed by the Owner's Representative.

B. Splicing.
   1. Interior: Provide fusion splices.
   2. Exterior: Do not splice at exterior unless splicing is indicated on Plans. In such circumstances, provide fusion splices.

C. Termination Methods.
   1. Review proposed breakout procedure with the Owner's Representative before beginning this work.
   2. Use full cable breakout method. Display both connectorized and non-connectorized fibers entering a patch panel.

3. Remove sheath so that no more than 4 inches of unstripped cable enters the panel.
4. Strip back a sufficient amount of cable so that fiber strands wrap at least one full wrap, circle or figure eight, inside the panel with the connectorized ends attached to the most distant bulkhead connectors.
5. Group together the fibers from each binder group with 0.125 inch nylon spiral wrap. (Commscope/Systimax, Panduit, Corning Cable Systems SAN-DT25-06, or equal.)

D. Outside Plant.
1. Obtain allowable pulling tension for underground fiber cable from the manufacturer. Use pulling equipment with tension gauges to verify that cable pulls do not exceed allowable pulling tension.
2. Loose Tube, Gel Filled Cabling - No flow of filling when tested in accordance with FOTP-81.

E. Loose Tube Breakout.
1. Install breakout tubing over the full exposed length of the fiber strands.
2. Install buffer tubing on all strands, including those not being connectorized as part of this Contract.
3. Reinforce and protect the junction of the cable sheath and buffer tubing using a method approved by the Owner's Representative before beginning this work.

3.2 COPPER BACKBONE TIE CABLE INSTALLATION AND TERMINATION

A. General:
1. Backbone cable(s) shall be installed in conduit system unless otherwise noted.

B. Sequencing:
1. If the installation of a tie cable requires the disconnection and removal of any existing cable(s) carrying active service prior to installation.
   a. Notify the Owner's Representative no less than 5 working days in advance of when this work is to be performed.
2. When this work is performed, the newly installed cables must be installed, tested and passed in one 24 hour period beginning when the active service on the existing cable is interrupted.

C. Installation of Tie Cable:
1. All tie cable between terminal blocks at IDF rooms shall be continuous, unspliced runs.
2. Termination of Voice or Shared Use Tie Cable:
   a. Cable shall be terminated on 66 Type punch blocks system in the following order:
      i. Terminate pairs and groups in order top to bottom and then left to right according to insulation or binder color as listed below.
      ii. “Mate” is the first wire of the pair to be terminated, “Wire” is the second.
   b. Comply with the following table:

Group or Pair Number	Mate	Binder or Wire
1	White	Blue
2	White	Orange
3	White	Green
4	White	Brown
5	White	Slate
6	Red	Blue
7	Red	Orange
8	Red	Green
9	Red	Brown
10	Red	Slate
11	Black	Blue
12	Black	Orange
13	Black	Green
14	Black	Brown
15	Black	Slate
16	Yellow	Blue
17	Yellow	Orange
18	Yellow	Green
19	Yellow	Brown
20	Yellow	Slate
21	Violet	Blue
22	Violet	Orange
23	Violet	Green
24	Violet	Brown
25	Violet	Slate

3. Cables containing pair counts of 50 or greater shall be terminated as follows:
   a. Columns of punch blocks stacked 2 high shall be mounted on the backboard.
   b. Beginning at the top right of the 1st column, first the blue binder will be punched down, followed by the orange binder directly beneath it.
   c. Binder punch will continue top to bottom, and then left to right until the entire cable has been terminated.
   d. Thus a 50-pair cable requires two punch blocks.
4. Upon completing the termination of all cables within an IDF, install a clear plastic cover at each punch block.

3.3 DATA/TELEPHONE IDF ROOM LAYOUT

A. General:
1. Final backboard design layout within an IDF room shall be approved by the Owner's Representative prior to work beginning on the backboard.
2. Reference the design basis layout in the plans and bring to the Owner's Representative's attention any field conditions that would prevent installation as shown on the plans. Submit for resolution in a timely manner.
3. Layout of cable around backboard:

a. All backbone cable shall be formed around the backboard before either rising or dropping vertically to the punch blocks on which they are to be terminated.
b. All backbone cable shall be organized in Wire Management Rings, Split D, Type WMRO. No tywraps or similar bindings are permitted.

4. Termination:
a. Terminate voice pairs and BDF tie cable on 66 blocks.

3.4 DATA/TELEPHONE NODE AND BDF ROOM LAYOUT

A. General:
1. Final backboard and cable runway design layout within the Telecomm Building or within a BDF room shall be approved by the Owner's Representative prior to work beginning.
2. Reference the design basis layout in the plans and bring to the Owner's Representative's attention any field conditions that would prevent installation as shown on the plans. Submit for resolution in a timely manner.

B. Layout of cable around backboard:
1. All cables shall be formed around the backboard before either rising or dropping vertically to the punch blocks on which they are to be terminated.
2. All cables shall be organized in Wire Management Rings, Split D, and Type WMRO. No tywraps or similar bindings are permitted.

C. For outside plant, flooded cables entering the Telecomm Building, a BDF or an IDF functioning as a building entrance facility:
1. Transition in a splice case to non-flooded cable prior to termination on protector blocks for voice pairs, or on an unprotected 66 block for systems pairs, where such are indicated. Where systems pairs are not indicated, assume all pairs are for voice use.
2. Position the splice case on the backboard where accessible for future service. Orient parallel to floor to prevent continuous gel flow from OSP cabling. Place on cable tray only where such placement is indicated on the plans.

END OF SECTION

SECTION 17150
COMMUNICATIONS HORIZONTAL CABLING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes, but is not necessarily limited to provision of:
   1. Horizontal Station Cabling
      a. Horizontal copper station cabling, meeting TIA/EIA Category 6 standards, homerun from receptacles to indicated BDF. Terminate on rack mounted patch panels, as indicated.
   2. For all cabling:
      a. Terminate on patch panels as specified in Section 17119 – Communications Termination Blocks and Patch Panels.
      b. Test cabling to demonstrate performance meets or exceeds specified standards using test equipment and methods as specified in Section 17100 – Structured Cabling, Basic Materials and Methods.
      c. Label cables, jacks, plates and patch panels as specified in Section 17053 – Identification for Communications Systems.
      d. Document on Record Documents as described in Section 17010 – Common Work Results for Communications.

B. Related Documents:
   1. Specification Section 17010 – Common Work Results for Communications applies to this Section.

C. Related Work in Other Sections:
   1. Section 17029 – Hangers and Supports for Communications Systems
      a. J-hooks and hangers for the work of this Section.
   2. Section 17033 – Conduits and Backboxes for Communications Systems
      a. Empty raceway for the work of this Section.
   3. Section 17036 – Cable Trays for Communications Sytstems
      a. Empty tray for the work of this Section.
   4. Section 17039 – Surface Raceways for Communications Systems
      a. Empty raceway for the work of this Section.
   5. Section 17053 – Identification for Communications Systems
      a. Labeling systems and execution for the work of this Section.
   6. Section 17119 – Communications Termination Blocks and Patch Panels
      a. Specification for patch panels and blocks used by work of this Section
   7. Section 17123 – Communications Cable Management
      a. Specification for innerduct, backboard and patch cord management used by the work of this Section.

1.2 REFERENCES

A. As listed in Section 17100 – Structured Cabling, Basic Materials and Methods.

1.3 SUBMITTALS

A. Conform with the requirements of Section 01300 – Administrative Requirements and Section 17010 – Common Work Results for Communications.

1.4 DELIVERY, STORAGE AND HANDLING

A. Procedures: In accordance with Section 01600 – Product Requirements and Section 17100 – Structured Cabling, Basic Materials and Methods.

1.5 SEQUENCING

A. Not Used.

PART 2 PRODUCTS

2.1 GENERAL

A. All products shall be NEW.

B. All devices shall comply with all parts of ANSI/TIA/EIA 568-B.1, B.2, B.3 Commercial Building Telecommunications Standard.

C. The wiring configuration for all telecommunications devices shall be T568-B.

D. All UTP cabling shall meet or exceed all requirements in this specification, ANSI/TIA/EIA S-80-576 that are applicable to four-pair inside wiring cable for non-plenum spaces within a building.

E. All Copper data cabling and data connectivity products shall be manufacturer-recommended end-to-end combinations (patch cords, station connectors, horizontal cabling, and patch panels). The selected combination must meet the following criteria:

1. ETL Verified Components to ANSI/TIA-568-B.2-1 (Category 6)
2. ETL Verified Patch Cords to ANSI/TIA-568-B.2-1 (Category 6)
3. ETL Verified Communications Cables to ANSI/TIA 568-B.2-1 (Category 6).

F. Products are specified throughout this specification either by reference standard or by manufacturer and part number in order to establish quality and performance characteristics of individual products. Contractor's options for selecting each product are as follows:

1. Product specified only by reference standards: Select any product meeting standards.
2. Product specified by naming several products and/or manufacturers: Select any product and/or manufacturer named.
3. Product specified by naming several products and/or manufacturers and reference standards: Select any product meeting standards. Product and/or manufacturer names indicate products and/or manufacturers, which meet standards.
4. Product specified by naming only product: Select product specified.
5. Product specified by naming one or more products and stating "or equal" with the specified product: Select any product named or submit request for substitution for any product not specifically named. Product substitutions submitted prior to bid shall be handled according to procedures outlined in section 00430 – Supplements to Bid Form. Product substitutions submitted after contract award shall be handled according to procedures outlined in sections 00700 – General Requirements and 01600 – Product Requirements.

2.2 DATA AND VOICE HORIZONTAL CABLE

A. Drawing Reference:
   1. Plenum rated (CMP) cables: ** UTP6-4P, where:
      ** = cable count
   2. Riser rated (CMR) cables: ** UTP6-4, where:
      ** = cable count

B. The horizontal cable, running to/from each data or voice port, shall be BLUE in color.

C. Manufacturer:
   1. In plenum spaces, Berk-Tek 4 pair, 24 AWG, Category 6, CMP, LanMark 1000 P/N 10032094 or equal.
   2. In spaces not noted as plenum space, Berk-Tek 4 pair, 24 AWG, Category 6, CMR, LanMark 1000 P/N 10032455 or equal.

2.3 MODULAR JACKS AND BLANK INSERTS

A. Modular Jacks
   1. Single modular inserts for data and voice ports shall be 8-position, 8-conductor, 180°, T568A/B.
   2. Manufacturer:
      a. The modular insert for data port #1 shall be DARK ORANGE, Ortronics P/N OR-TJ600-43 or equal.
      b. The modular insert for data port #2 shall be DARK ORANGE, Ortronics P/N OR-TJ600-43 or equal.
      c. The modular insert for data port #3 shall be DARK ORANGE, Ortronics P/N OR-TJ600-43 or equal.
      d. The modular insert for data/voice port #4 shall be DARK BLUE, Ortronics P/N OR-TJ600-36 or equal.

B. Blank Inserts
   1. All empty positions within a faceplates and surface mount boxes shall be filled with blank inserts.
   2. Manufacturer:
      a. Ortronics TracJack, FOG WHITE P/N OR-42100002-88 or equal.

2.4 WORK AREA FACEPLATES AND DEVICE BOXES

A. Drawing Reference:
   1. MMP4 = Wall mount, single gang, 4-port faceplate
   2. MMP6 = Wall mount, single gang, 6-port faceplate
   3. IRR4 = Inline surface raceway, single gang, 4-port faceplate
   4. IRR6 = Inline surface raceway, single gang, 6-port faceplate
   5. OMP4 = System furniture, 4-port faceplate
   6. OMP6 = System furniture, 6-port faceplate

B. All faceplates shall be UL listed and CSA certified.

C. All faceplates shall be constructed of high-impact, ABS plastic UL 94V-0 construction (unless otherwise specified).

D. All faceplates shall have a minimum of four (4) modular inserts.

E. Manufacturer:

1. Wall mount, single gang 4 port faceplate Ortronics TracJack Series, FOG WHITE, P/N OR-40300546 or equal.
2. Wall mount, single gang, 6 port faceplate Ortronics TracJack Series, FOG WHITE, P/N OR-40300545 or equal.
3. Inline surface raceway faceplates shall be from the same manufacturer and product series as the raceway itself. Faceplates shall be specifically designed by the manufacturer to accept the data and voice modular inserts specified in this section.
4. System furniture, 4-port faceplate Ortronics TracJack Series, BLACK, P/N OR-40300633-00 or equal.

2.5 WALL TELEPHONE FACEPLATES

A. Drawing References:
   1. Wall Mounted Telephone, Flush
   2. 630A

B. Construction, where not otherwise specified, scheduled, or indicated:
   1. Mechanically fastened to building or similar. Adhesive fastening is not acceptable.
   2. Stainless steel or high strength 94VO plastic.
   3. Mounts to single gang ring, single gang box, or surface mount box. Refer to schedule on drawings.
   4. Shall accept one (1) modular jack specified in paragraph 2.3.
   5. Face of jack is flush with surface of faceplate when mounted into faceplate.

C. Manufacturer:
   1. Ortronics OR-40300637
   2. Or equal.

2.6 DATA PATCH CORDS

A. All UTP patch cords shall be factory terminated.

B. Lengths at the workstation shall not be less than 5 ft nor more than 9 ft.

C. Lengths at the patch panel shall not be less than 3 ft nor more than 15 ft.

D. Coordinate lengths in with the owner through the construction chain of command prior to purchasing.

E. Manufacturer:
   1. 3 ft patch cords Ortronics Clarity Category 6, BLUE, P/N OR-MC603-06 or equal.
   2. 5 ft patch cords Ortronics Clarity Category 6, BLUE, P/N OR-MC605-06 or equal.
   3. 7 ft patch cords Ortronics Clarity Category 6, BLUE, P/N OR-MC607-06 or equal.
   4. 9 ft patch cords Ortronics Clarity Category 6, BLUE, P/N OR-MC609-06 or equal.
   5. 15 ft patch cords Ortronics Clarity Category 6, BLUE, P/N OR-MC615-06 or equal.

2.7 VOICE PATCH CORDS

A. This section applies to patch cords used to distribute dial tone from voice backbone termination blocks to patch panels in the telecommunications Entrance Facility (EF)

and each Telecommunications Room (TR) ONLY. See paragraph 2.5 for specifications for patch cords used to distribute data connections in Telecommunications Equipment Rooms (ER), Telecommunications Rooms (TR), and work areas.

B. Voice patch cords shall be single-ended, 4-pair solid cable assembly, T568B, gray jacket, 20 ft, CMR, no boot

C. Manufacturer:
   1. Siemon P/N IC5-8A-20
   2. Or equal.

2.8 UNSPECIFIED PRODUCTS

A. Any product not specifically addressed in this specification or on the drawings but required in order to provide a complete and functional structured cabling system shall be provided by the telecommunications contractor in a quantity and level of quality consistent with the specified items. Unspecified products shall be approved by the owner through the construction chain of command prior to installation. Product submittal requirements for specified products shall also apply to unspecified products.

PART 3 EXECUTION

3.1 GENERAL

A. All devices shall comply with ANSI/TIA/EIA 568-B., B.2, B.3 Commercial Buildings Telecommunications Standard.

B. All telecommunication outlets shall be T568B wiring configuration.

C. All products shall meet or exceed all requirements of this specification.

D. The telecommunications contractor's work shall comply with all contract documents including, but not limited to:
   1. Architectural floor plans
   2. Furniture plans
   3. Equipment layouts
   4. Electrical contract documents
   5. Telecommunications contract documents

E. The telecommunications contractor shall coordinate all work with all other trades and:
   1. Project manager
   2. General contractor
   3. Electrical contractor
   4. Owner

F. The telecommunications contractor shall refer to drawings for pathways including sleeves, conduits, cable trays and runways, and J-hook supports to be utilized for the structured cabling system.

G. The telecommunications contractor shall perform work so that progress of entire project including work of other sections is not interfered with or delayed.

H. The telecommunications contractor shall obtain detailed installation information from all manufacturers under other specification sections that affect the installation of the

structured cabling system and provide information on products furnished under this section that affect work specified in other sections.

I. The telecommunications contractor shall not disrupt existing services. Existing services shall remain operational at all times unless there is a compelling need to disrupt them. If such a compelling need is determined to exist, then the telecommunications contractor shall coordinate an outage through the construction chain of command at least 48 hours in advance.

3.2 WORKMANSHIP

A. All work shall adhere to the reference standards in Part 1 of this specification.

B. Work shall be executed in workmanlike manner and shall be neat, plumb, parallel to the building structure, perpendicular to all electronics and associated cabling and neat in appearance when completed.

C. The telecommunications contractor shall maintain maximum headroom at all times and shall not run work exposed unless noted as such on the drawings.

D. Material and equipment shall be new and installed according to manufacturer's recommended best practices so that the completed installation operates safely and efficiently.

E. The telecommunications contractor is responsible for the greater quantity and better quality where conflicts exist.

F. Any reference to telecommunications outlet shall indicate faceplate, modular insert, termination, cabling, labeling, etc.

G. All cabling shall be terminated at both ends unless otherwise noted on the drawings.

3.3 DATA AND VOICE HORIZONTAL CABLE

A. Install one (1) horizontal Category 6 cable from each data and voice modular insert within faceplate to its corresponding patch panel.

B. All cables shall be labeled at both ends with the cable ID using equipment and permanent labels approved by the owner. See Section 17053 – Identification for Communications Systems for cable identification specifications.

C. All four pairs of each horizontal cable shall be terminated at both ends.

1. One end of the horizontal cable shall be terminated in an 8-position, 8-conductor modular jack at the telecommunications outlet.
2. One end of the horizontal cable shall be terminated in an 8-position, 8-conductor 110 data patch panel within the Telecommunications Room (TR).

D. Install cable in specified raceways and cable trays.

E. Cable pulling: Pulling tension: Maximum pulling tensions for 4-pair horizontal UTP cable shall not exceed 110N (25 lbf).

F. Maintain cable twist to within ¼ inch of the main point of Insulation Displacement Contact (IDC).

G. When stripping cable for termination remove only a minimum amount (i.e., as little as possible) of cable jacket insulation (not to exceed ½ inch).

H. Additional cable slack (Service Loop) shall be provided at both ends for maintenance or future cabling system changes:

1. Telecommunications Entrance Facility (EF)/Telecommunications Rooms (TRs)/Service Loop: 10 feet (arranged in figure 8 or serpentine fashion wherever possible to avoid inductance).

2. Work Area or Wall Telephone outlet: 3 feet

I. Splices are not permitted in any horizontal cabling.

J. No horizontal cable run from modular connector to patch panel shall exceed 90 m (295 ft) including slack.

K. Horizontal cable shall run loose throughout all conduits. At no time shall any horizontal cable within a conduit be secured by zip ties, electrical, tape, hook and loop closure straps or similar bindings.

L. Cables for corresponding data and voice ports shall be terminated on separate patch panels. See Section 17053 – Identification for Communications Systems for cable identification specifications.

1. Patch panel A shall be used to terminate data port #1 for all stations.
2. Patch panel B shall be used to terminate data port #2 for all stations.
3. Patch panel C shall be used to terminate data port #3 for all stations.
4. Patch panel D shall be used to terminate data/voice port #4 for all stations.
5. Patch panel P shall be used to terminate all wall telephones.

3.4 MODULAR JACKS AND BLANK INSERTS

A. Install all data and voice modular inserts.

B. Refer to the drawings for configuration and orientation of modular inserts within each data and voice faceplate.

C. Refer to the drawings for configuration and orientation of icons.

3.5 WORK AREA AND WALL TELEPHONE FACEPLATES AND DEVICE BOXES

A. Install all faceplates and device boxes.

B. Refer to the drawings for location of work area and wall telephone faceplates and device boxes.

C. Refer to the drawings for configuration and orientation of work area and wall telephone faceplates and device boxes.

D. Coordinate exact location, configuration, and orientation of all work area and wall telephone faceplates and device boxes through the construction chain of command prior to installation.

3.6 DATA PATCH CORDS

A. The telecommunications contractor shall provide a quantity of patch cords to match 100 percent of the total quantity of data and voice ports terminated within each installed patch panel.

B. The telecommunications contractor shall provide a quantity of patch cords to match 100 percent of the total quantity of installed data modular inserts within the data/voice faceplates at the work areas.

C. The telecommunications contractor shall deliver all patch cords to Owner's Representative.

3.7 TESTING AND CERTIFICATION

A. 100 percent of horizontal data and voice cabling shall be tested and certified in accordance with Section 17160 – Communications Structured Cable Testing and Certification.

END OF SECTION

APPENDIX D – MURRAY ADOBE RECOMMENDATIONS

Applied EARTHWORKS Inc.

811 El Capitan Way, Suite 100
San Luis Obispo, CA 93401-8943
O: (805) 594-1590 | F: (805) 594-1577
www.appliedearthworks.com

February 16, 2023

Brian Nelson
City of San Luis Obispo
919 Palm Street
San Luis Obispo, CA 93401

RE: Murray Adobe Recommendations for Phase 1 of the Mission Plaza Concept Plan

Dear Mr. Nelson:

At the request of RRM Design Group, Applied EarthWorks, Inc. (Æ) is pleased to present the following recommendations for appropriate treatment of the Murray Adobe during implementation of Phase 1 of the Mission Plaza Concept Plan (Plan). Phase 1 of the Plan includes removal of the trellis adjacent to the adobe, removal and replacement of landscaping and hardscaping, and extending the existing patio along the southwest wall to the southeast. Other actions include removal of existing public restrooms, planters, mature trees, and hardscape near Murray Adobe within Mission Plaza; construction of new public restrooms; and installation of new hardscape, planters, and trees. Murray Adobe is on the City of San Luis Obispo Master List of Historic Resources and is considered a historical resource under the California Environmental Quality Act (CEQA). Projects that are consistent with the Secretary of the Interior's (SOI) Standards will not result in a significant impact under CEQA.

On December 20, 2022, Æ Senior Architectural Historian Amber Long met with Mark Sauer, owner of Mark Sauer Construction, Debbie Rudd, Principal at RRM Design Group, and representatives from the City of San Luis Obispo (City) in Mission Plaza to tour Murray Adobe. During the site visit Mr. Sauer visually inspected the interior and exterior of the adobe, while discussing the project with the team. Mr. Sauer has worked extensively with historic adobe buildings around California and has successfully implemented protection measures that have been successful over decades of monitoring.

The following information is summarized from Mr. Sauer's report and subsequent email (see attached). All recommendations are consistent with the SOI Standards for the Treatment of Historic Places (Grimmer 2017).

Existing Condition

The adobe is in fairly good condition except for the exposed adobe wall. The existing cement-based plaster is not the correct application for the adobe. Adobe bricks expand and contract, while the cement-based plaster is rigid, which can create structural issues. Sections of the plaster are delaminating from the interior and exterior of the adobe.

Phase 1 Recommendations. The following recommendations should be followed during Phase 1 of the Plan.

- Demolition of the pavement adjacent to the adobe should start with a cut 3 to 4 feet away from the exposed adobe. The pavement will then be removed by hand, limiting the potential for damage to the adobe. Where new paving will abut the adobe, some form of masonry protection

board should be installed. This process should also be followed where the patio will be extended along the adobe, to the southeast.

- The existing flashing, trellis, and patio cover can be removed. A new ledger should be installed directly to the adobe wall using epoxy anchors and should support a small patio cover over the exposed adobe wall. A structural engineer should be consulted regarding the size, depth, and frequency of the anchors.

- Existing plaster should be cut away to allow direct anchoring of the ledger to the adobe wall. Enough plaster should be removed so the top of the new flashing is covered. Copper flashing is preferable. Expanded metal lath with 3-inch exterior grade screws and fender washers are recommended. Plaster around the ledger and new flashing will need to be repaired. New lime plaster should not contain cement.

- The exposed area of the adobe wall should be reduced to a 3 by 3 foot area. The area will be used as a view panel with a wood frame and laminate glass. The remaining exposed adobe should be covered in lime plaster. New lime plaster should not contain cement.

Recommendations for Additional Work. After completion of Phase 1, the following recommendations should be followed to address ongoing condition issues.

- All cement-based plaster should be removed from the interior and exterior adobe walls and a new lime-based plaster applied. Additional information can be found at www.limes.us.

- Proper site drainage is critical to preserving Murray Adobe. All mulch should be removed within 12 to 18 inches of the adobe walls. Irrigation must be altered so that no water hits the walls or pools at the base of the walls. Based on the direction of the slope, water will continue to flow from Mission San Luis Obispo de Tolosa towards the adobe to San Luis Creek. French drains could be installed to route the flow of water around the adobe.

- All existing wood windows need repairs. Windows can be salvaged by repairing the glass and glazing. Wood repairs should include “dutchman” repairs and the addition of wood consolidating products. Additional information can be found at www.abatron.com.

- The roof needs to be replaced; however, it is currently holding out water. A new roof will require new ply sheathing.

- A seismic retrofit should be considered for the adobe as part of a structural upgrade.

Secretary of the Interior’s Standards

Until a new use is proposed for Murray Adobe, the SOI Standard for Preservation should be followed to preserve the adobe in its current configuration. The recommendations above, including proper lime plaster coatings, reducing the exposed area of the adobe, improving drainage and window repairs, are consistent with the Standard for Preservation, which is:

> "… the act or process of applying measures necessary to sustain existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacements and new construction." (Grimmer 2017:2)

The following National Park Service Preservation Briefs and Preservation Tech Notes provide further guidance on the recommendations above. They can be found at www.nps.gov.

- *Preservation Brief 4: Roofing for Historic Buildings ((Sweetser 1978)*
- *Preservation Brief 5: The Preservation of Historic Adobe Buildings ((Tiller and Look 1978)*
- *Preservation Brief 9: The Repair of Historic Wooden Windows (Myers 1981)*
- *Preservation Brief 10: Exterior Paint Problems on Historic Woodwork (Weeks and Look 1982)*
- *Preservation Brief 41: The Seismic Rehabilitation of Historic Buildings (Aguilar 2016)*
- *Temporary Protection 3: Protecting a Historic Structure During Adjacent Construction (Randl 2001)*
- *Windows 1: Planning Approaches to Window Preservation (Fisher 1984)*
- *Windows 4: Replacement Wooden Frames and Sashes (Feist 1984)*
- *Windows 14: Reinforcing Deteriorated Wooden Windows (Stumes 1986)*

The preceding recommendations are intended to limit or eliminate any unintended damage to Murray Adobe from implementation of Phase 1 of the Plan. In the event of unintended damage, including but not limited to new cracking or chipping plaster, or crumbling adobe bricks, work in the area around Murray Adobe should stop and a structural engineer and/or adobe specialist consulted.

Æ appreciates the opportunity to provide this guidance. If you have further questions, please contact Managing Principal Erin Enright at (805) 594-1590, extension 316, or eenright@appliedearthworks.com.

Sincerely,

Amber Long, M.A.
Senior Architectural Historian
Applied EarthWorks, Inc.

Attachments: Site Visit Report 1.12.23; Email from Mark Sauer 2.7.2023; and C. Ledger With Flashing Simple Sketch

REFERENCES CITED

Aguilar, Antonio
2016 *The Seismic Rehabilitation of Historic Buildings*. Preservation Briefs No. 41. U.S. Department of the Interior, National Park Service, Technical Preservation Services, Washington, D.C.

Feist, William C.
1984 *Replacement Wooden Frames and Sash, Protecting Woodwork against Decay.* Windows, No. 4. Preservation Tech Notes. U.S. Department of the Interior, National Park Service, Preservation Assistance Division, Washington, D.C.

Fisher, Charles E.
1984 *Planning Approaches to Window Preservation.* Windows, No. 1. Preservation Tech Notes. U.S. Department of the Interior, National Park Service, Preservation Assistance Division, Washington, D.C.

Grimmer, Anne E.
2017 *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, & Reconstructing Historic Buildings*. Rev. ed. U.S. Department of the Interior, National Park Service, Technical Preservation Services, Washington, D.C.

Myers, John H.
1981 *The Repair of Historic Wooden Windows*. Preservation Brief No. 9. U.S. Department of the Interior, National Park Service, Preservation Assistance Division, Washington, D.C.

Randl, Chad
2001 *Protecting a Historic Structure During Adjacent Construction.* Temporary Protection, No. 3. Preservation Tech Notes. U.S. Department of the Interior, National Park Service, Heritage Preservation Services, Washington, D.C.

Stumes, Paul
1986 *Reinforcing Deteriorated Wooden Windows.* Windows, No. 14. Preservation Tech Notes. U.S. Department of the Interior, National Park Service, Preservation Assistance Division, Washington, D.C.

Sweetser, Sara M.
1978 *Roofing for Historic Buildings*. Preservation Brief No. 4. U.S. Department of the Interior, National Park Service, Preservation Assistance Division, Washington, D.C.

Tiller, de Teel Patterson, and David W. Look
1978 *Preservation of Historic Adobe Buildings*. Preservation Briefs No. 5. U.S. Department of the Interior, National Park Service, Heritage Preservation Services, Washington, D.C.

Weeks, Kay D., and David W. Look
1982 *Exterior Paint Problems on Historic Woodwork*. Preservation Brief No. 10. U.S. Department of the Interior, National Park Service, Preservation Assistance Division, Washington, D.C.

Mark Sauer Construction, Inc.
19712 Temescal Canyon Road
Corona, CA 92881

Phone: **(951) 279-4245**
Fax: (951) 279-5917
Website: www.msauer.com
Email: contact@msauer.com
Small Business Cert. #0035176

California License # 500572 B | *Excellence since 1986!* | Nevada License # 0068157 B

Submitted to:
Amber Long, M.A.
Applied EarthWorks, Inc.
Senior Architectural Historian / Project Manager

01/12/23
Sent Electronically

Site Visit Report for:
Murray Adobe
747 Monterey St.
San Luis Obispo, Ca.

On December 20th, 2022 Mark Sauer, President & CEO of Mark Sauer Construction, Inc. (MSC) visited the Murray Adobe. We were asked by Amber Long, Applied EarthWorks, Inc. to visit the site, provide general assessments and author a site visit report.

The adobe is situated in a downtown City park with high public use. The Murray Adobe has a rich history and what remains of the original adobe is an excellent example early California living.

The observation of MSC is the Adobe is in reasonably good condition. Except for a large exterior area of exposed adobe block the building is covered with a cement-based plaster. This is not a good application for adobe structures. Adobe expands and contracts with the changes in the atmospheric conditions. Cement-based plaster is ridged. This leads to undetected damage to the adobe under the cement-based plaster. By sounding the walls, sections of the plaster are found to be delaminating from the adobe. MSC recommends that all cement-based plaster (inside + out) be removed and a new application of a lime-based plaster be applied. Further reference for lime plaster can be found at: http://www.limes.us/

MSC understands that the existing Trellis and the paving will be removed. MSC recommends that demolition of the paving start with a 3' - 4' section off the adobe wall be demolished first. This section should be done by hand to limit collateral damage to the adobe. At any point where new paving is to be in contact with the adobe, some form of masonry protection board should be installed. Any alteration to the Trellis that would have a small section to serve as a protective feature for the adobe is acceptable. A new treated wood ledger can be fastened to the adobe with epoxy anchors. See a similar example epoxy anchoring: https://youtu.be/ZiokvnKg7TY

Site drainage will be a critical part of the general preservation of the Murray Adobe. MSC understands there is an up-coming development of the surrounding park. Drainage and surface water flow will be important considerations. Attached find a simple sketch of drainage at a historic adobe

It is unknown to MSC if the adobe has received a seismic retrofit. If not, we highly recommend a structural up-grade be part of the master plan. The roof has long exceeded its life expectancy. It seems to be holding the water out as of now. Structural up-grade and/or roofing will call for new ply sheathing. This will be part of the stabilization and weather proofing of the Adobe.

All windows need restoration. All can be salvaged and repaired. It should be expected that the repairs will require glass and glazing, "dutchman" repairs and application of wood consolidation. See additional information at: https://www.abatron.com/

It is important that all work on the Murray Adobe is done under the Secretary of the Interior Standards for Historic Preservation.

Please see the attached photos

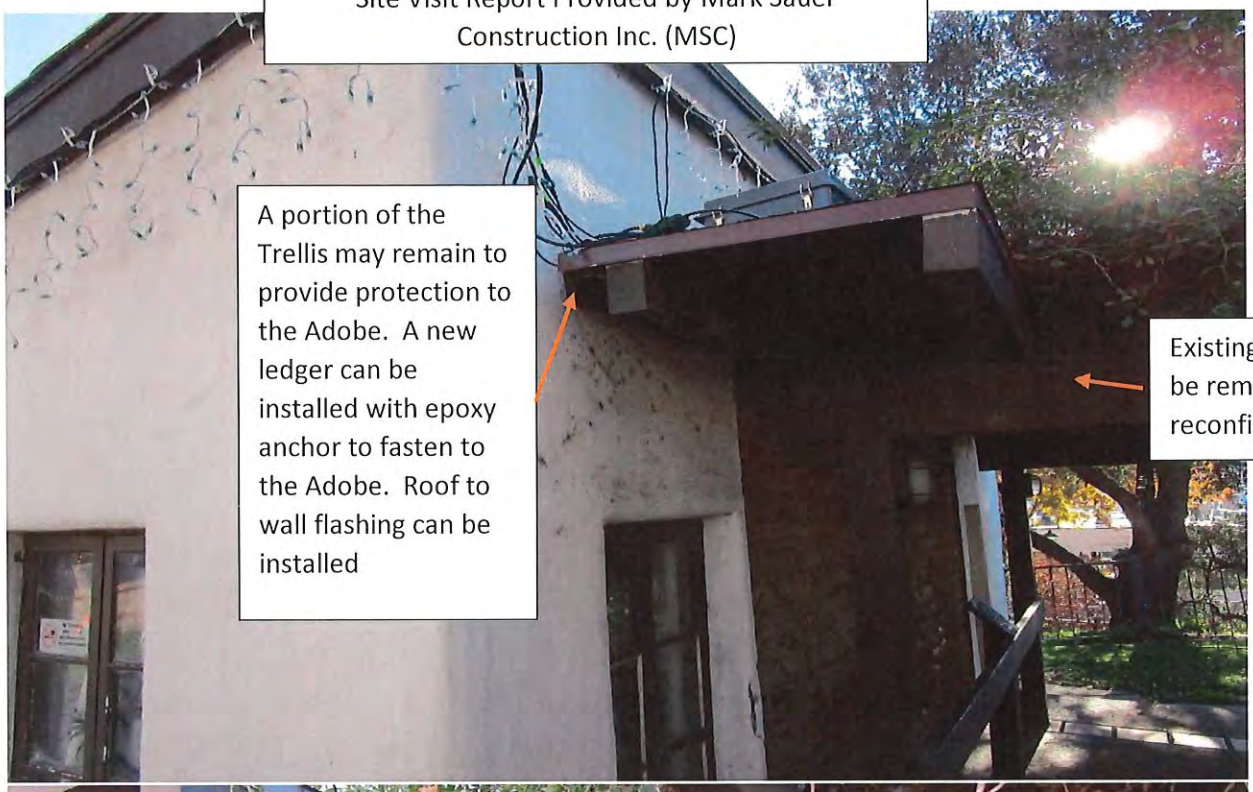
Submitted by:

Mark Sauer
President & CEO MSC Inc.

Murray Adobe

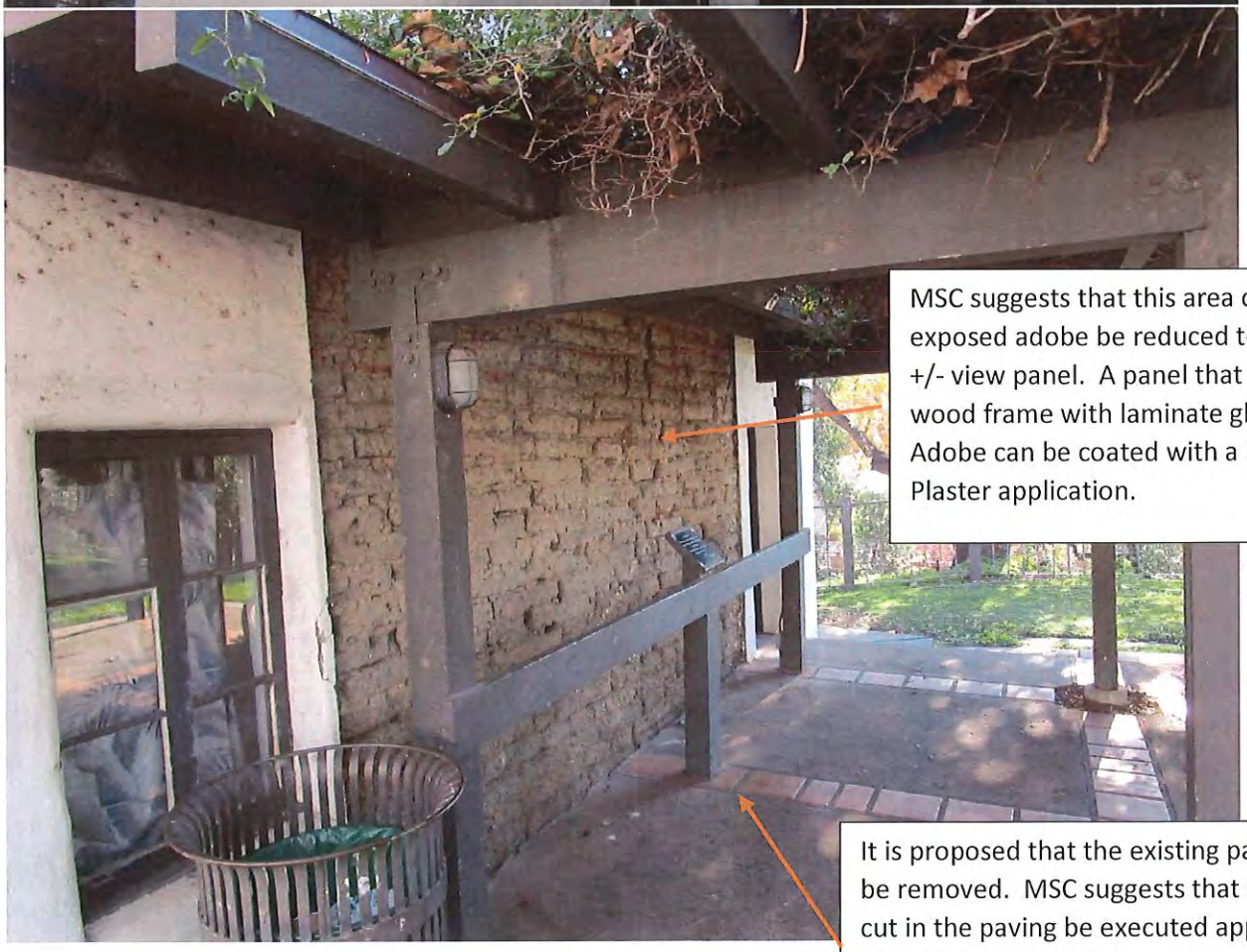
San Luis Obispo

Site Visit Report Provided by Mark Sauer Construction Inc. (MSC)



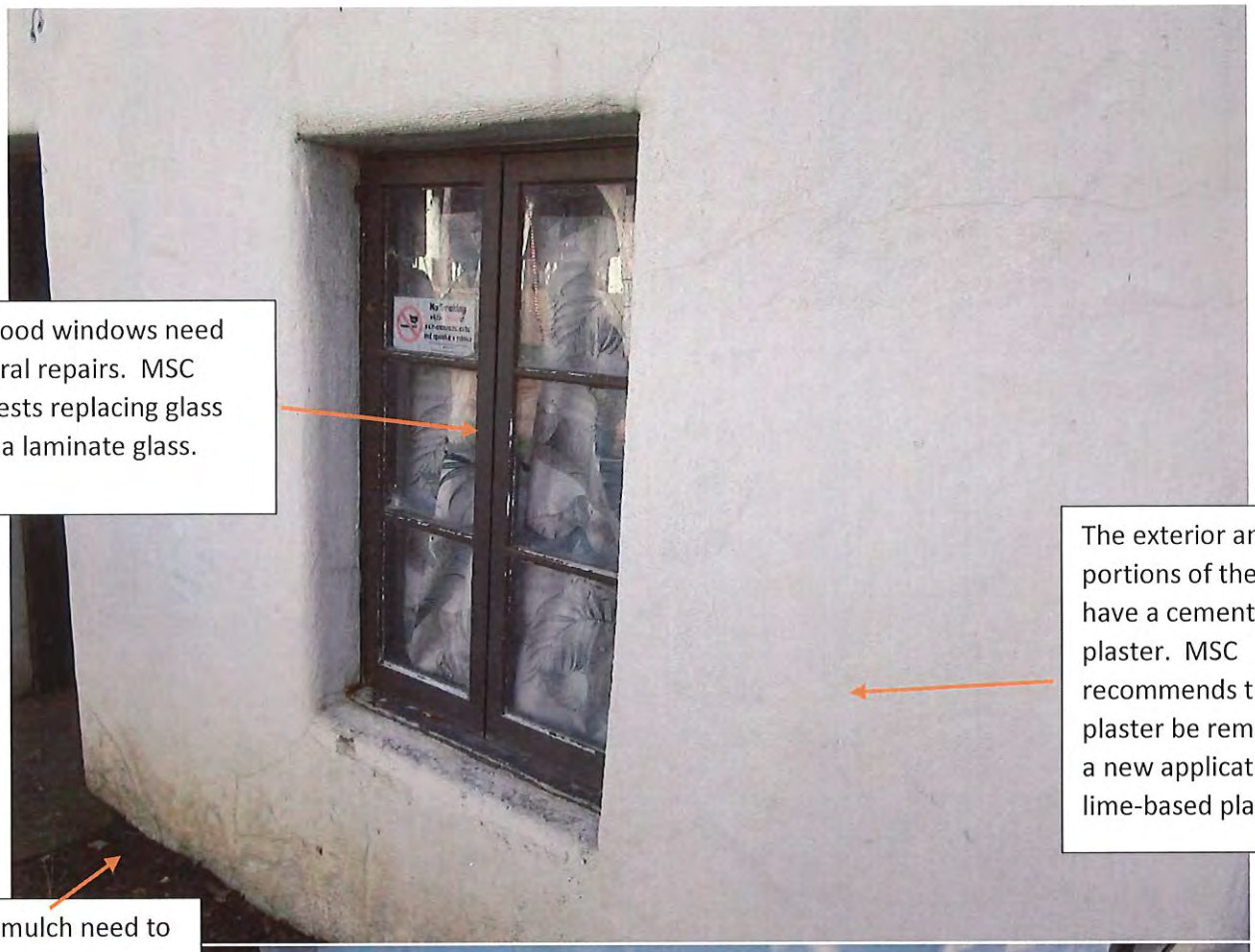
A portion of the Trellis may remain to provide protection to the Adobe. A new ledger can be installed with epoxy anchor to fasten to the Adobe. Roof to wall flashing can be installed

Existing Trellis to be removed or reconfigured.



MSC suggests that this area of exposed adobe be reduced to a 3'x3' +/- view panel. A panel that is a wood frame with laminate glass. The Adobe can be coated with a Lime Plaster application.

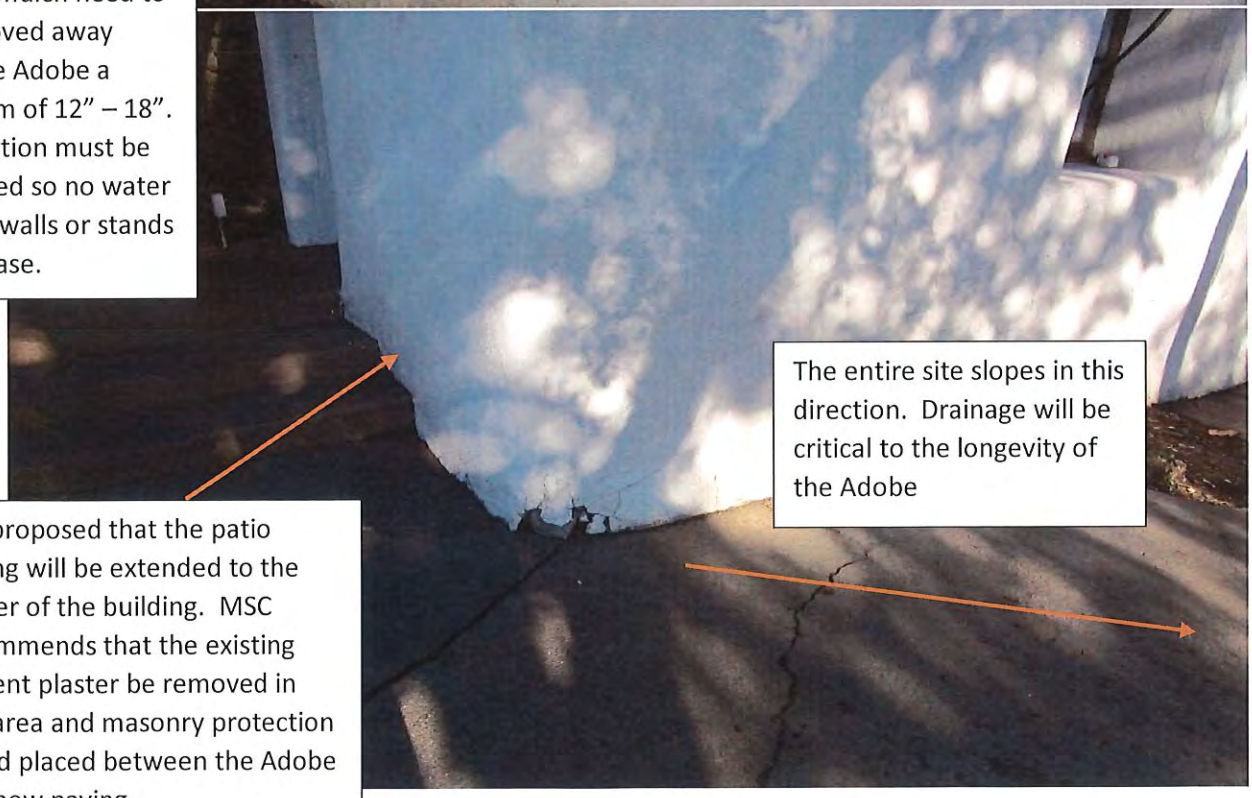
It is proposed that the existing paving will be removed. MSC suggests that a control cut in the paving be executed approx. 3'-4' away from the Adobe and removal be done by hand to limit collateral damage to the Adobe



All wood windows need general repairs. MSC suggests replacing glass with a laminate glass.

The exterior and large portions of the interior have a cement-based plaster. MSC recommends this plaster be removed and a new application of a lime-based plaster.

Any/All mulch need to be removed away from the Adobe a minimum of 12" – 18". All irrigation must be controlled so no water hits the walls or stands at the base.

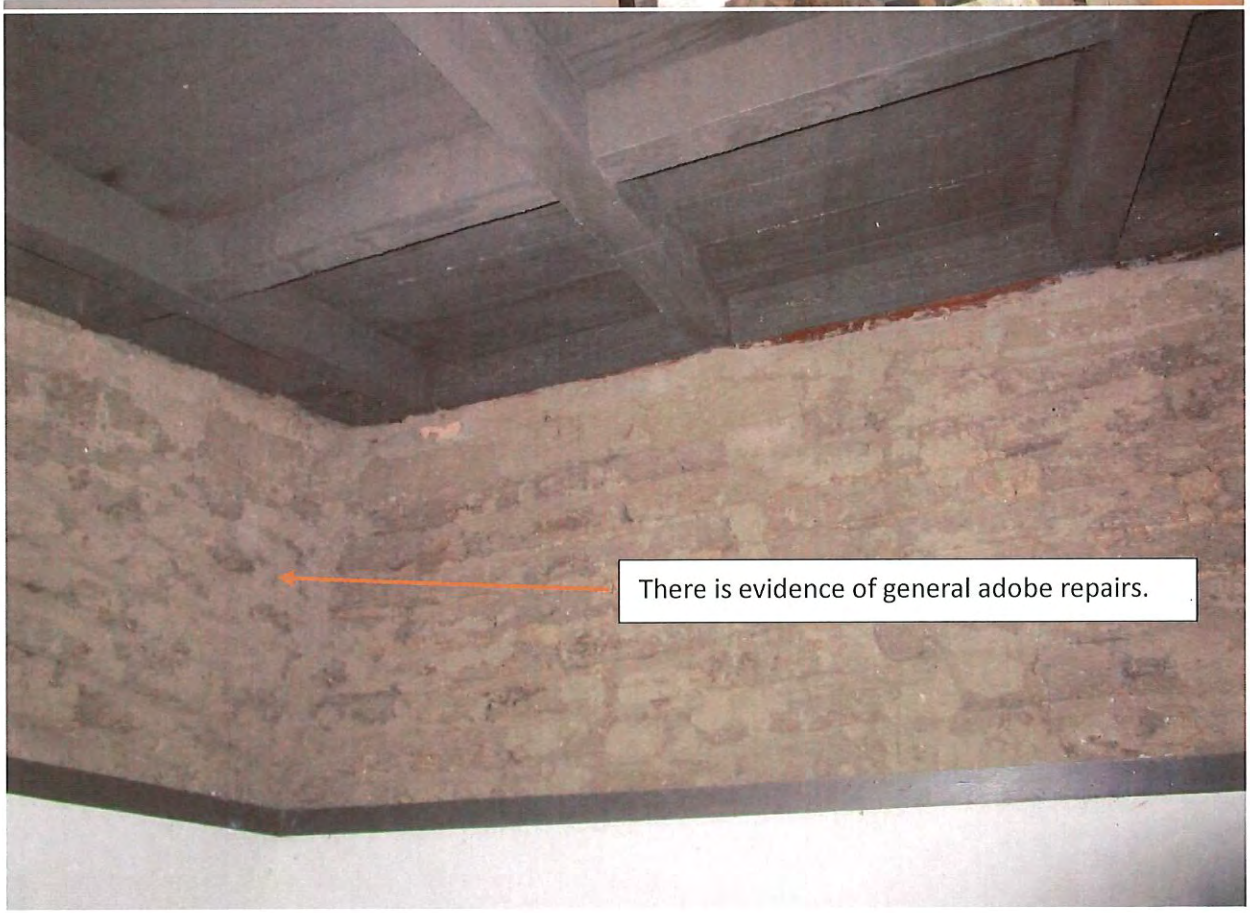


The entire site slopes in this direction. Drainage will be critical to the longevity of the Adobe

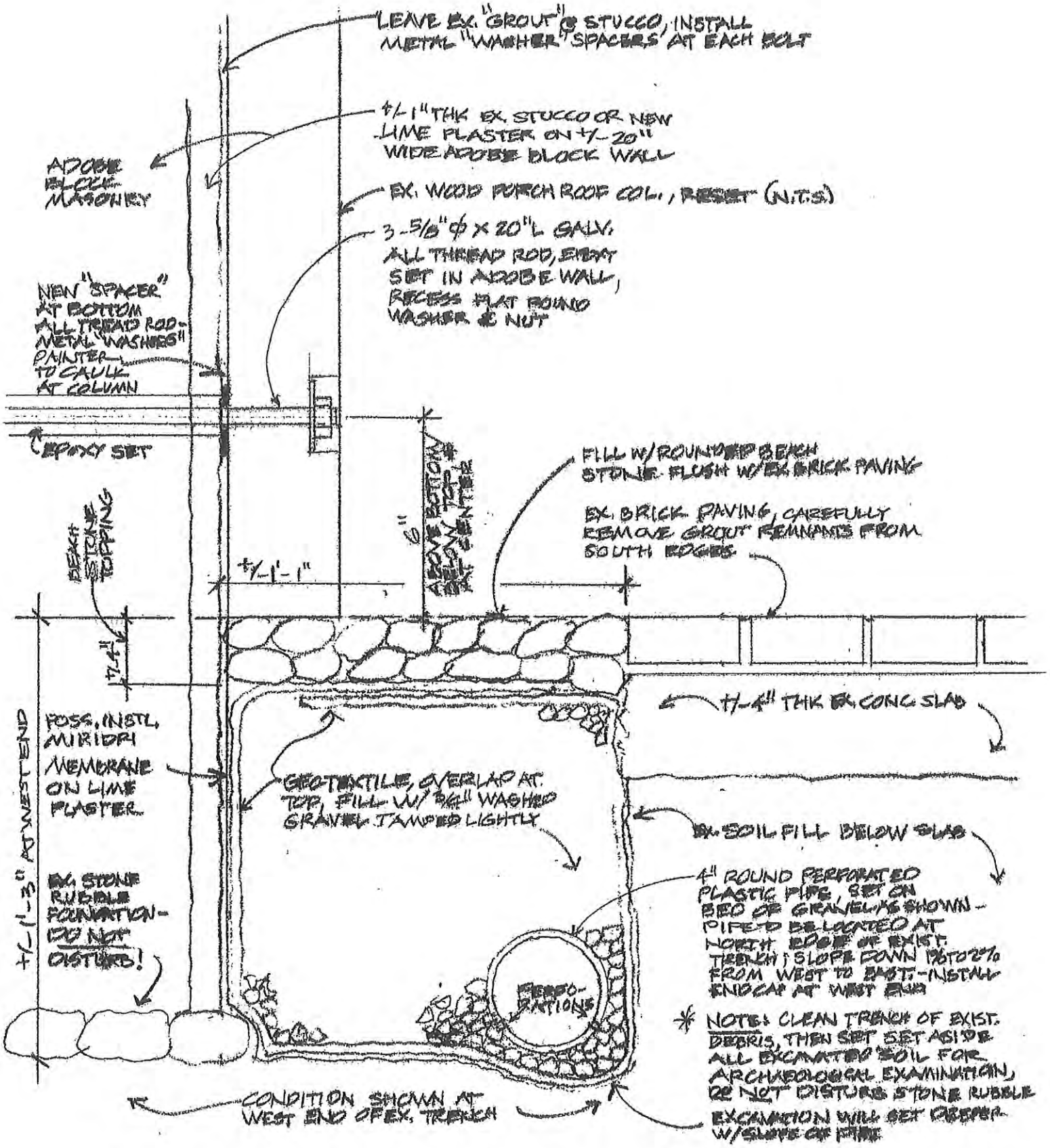
It is proposed that the patio paving will be extended to the corner of the building. MSC recommends that the existing cement plaster be removed in this area and masonry protection board placed between the Adobe and new paving.

It is unknown to MSC if this adobe has had a seismic retrofit. If no structural up-grade has been executed it is highly recommended

Interior plaster should be removed leaving the adobe walls raw. Typical.



There is evidence of general adobe repairs.



MICHAEL WHITE ADOBE – FILLING AT TRENCH AT NORTH WALL OF SOUTH WING

From: Mark Sauer
To: Amber Long
Subject: RE: Murray Adobe
Date: Tuesday, February 7, 2023 10:40:00 AM
Attachments: Ledger with Flashing simple sketch 2.07.23.pdf

Hi Amber

Sorry I overlooked that part. I envision something like this.

Incorporated into the new or reworked wood patio cover/trellis a new or added 4x (or greater) ledger can be installed. This ledger should be treated lumber. The ledger can be anchored to the adobe wall using epoxy anchors. A structural engineer should be consulted to recommend the size, depth and frequency of these anchors. The anchors will be placed either horizontally or at a 22-degree angle. This will also be per the engineer's recommendations.

Were the new ledger is installed the existing plaster needs to be cut away and the ledger installed directly to the adobe wall. Enough plaster needs to be removed so the top vertical leg of the new flashing (preferably copper) gets covered. Expanded metal lath should be used in the repair area. Install lath with 3" exterior grade screws with fender washers. Please see my simple sketch.

Plaster will need to be repaired all around the new ledger.

If the exiting patio cover/trellis is to remain and new "ledger" can be installed above the existing following the same procedure.

Sincerely
Mark Sauer
President & CEO, MSC, Inc.

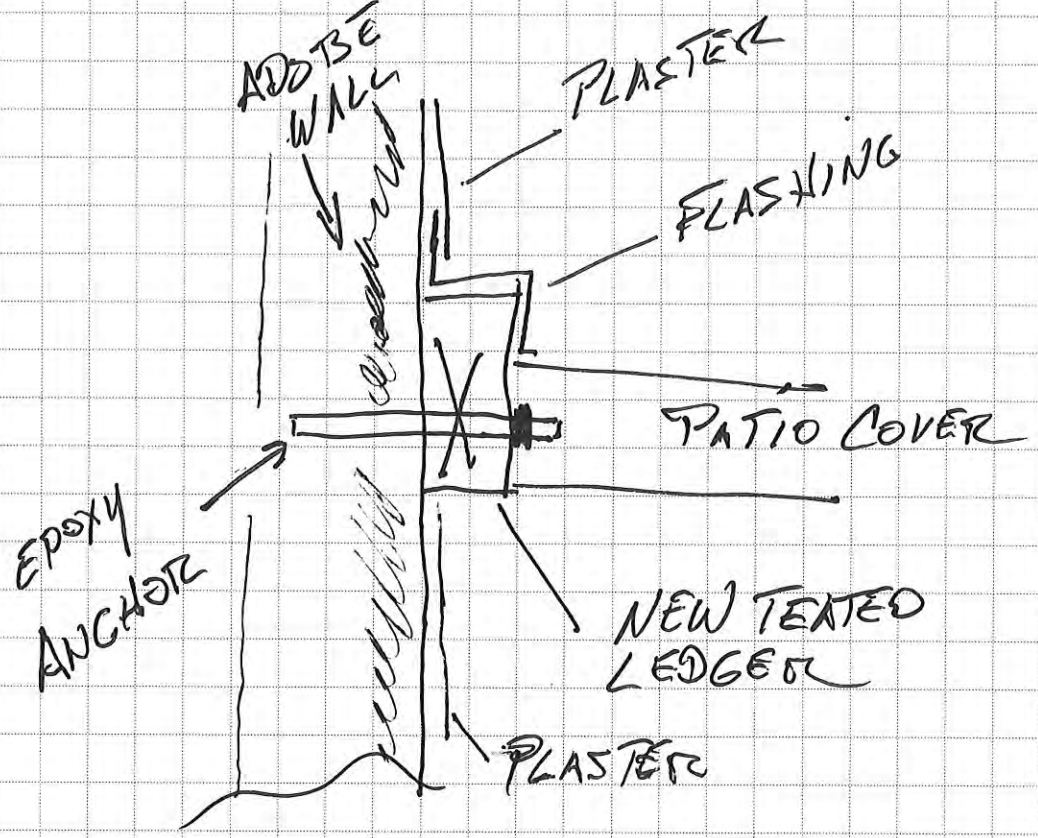
MSC EXCELLENCE SINCE 1986!
INTEGRITY ♦ CRAFTSMANSHIP
VALUE ♦ SAFETY

-Mark Sauer Construction, Inc.-
Corporate Office
19712 Temescal Canyon Rd.
Corona, Ca. 92881-5656
951 279-4245
951 279-5917 fax

follow us on facebook

MARK SAUER CONSTRUCTION, INC.
General Contractor Lic. #500572
19712 Temescal Canyon Rd.
CORONA, CALIFORNIA 92881
(951) 279-4245 Fax (951) 279-5917

JOB MURRAY ADOBE
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE 2/7/23
CHECKED BY _____ DATE _____
SCALE Ø



* IF PATIO IS TO BE REBUILT

APPENDIX E – ARCHEOLOGICAL MONITORING PLAN

Mission Plaza Restroom and Kiosk Project

Archaeological Monitoring Plan

prepared for

City of San Luis Obispo
Public Works Department
919 Palm Street
San Luis Obispo, California 93401

prepared by

Rincon Consultants, Inc.
1530 Monterey Street, Suite D
San Luis Obispo, California 93401

February 2023

RINCON CONSULTANTS, INC. SINCE 1994

Please cite this report as follows:

Bilchak, Rachel, Dustin Merrick, Ken Victorino, Shannon Carmack, Christopher W. Purtell

2023 *Mission Plaza Restroom and Kiosk Project Archaeological Monitoring Plan, San Luis Obispo County, California*. Rincon Consultants Project No. 23-14824. Report on file at Rincon Consultants, Inc. 180 North Ashwood Avenue Ventura, California 93001.

Table of Contents

Figures

This page intentionally left blank.

1 Introduction

Rincon Consultants, Inc. (Rincon) was retained by the City of San Luis Obispo (City) to provide an Archaeological Monitoring Plan (AMP) in support of the Mission Plaza Restroom and Kiosk Project (project) in San Luis Obispo, California. The AMP will address the details, timing, and responsibility of the required Conditions of Approval (CoA) for archaeological monitoring activities.

The City proposes to construct a 504 square foot restroom and a 165 square foot kiosk within Mission Plaza in San Luis Obispo, California. The proposed project would include demolition of the existing site structures, utilities, and select trees and landscaping within the project site. Proposed construction activities include the addition of plaza and patio space, a bar seating area, a reconstructed restroom, and a digital art kiosk. The project will also include new site utilities and landscaping.

This Archaeological Monitoring Plan (AMP) was prepared by Rincon Consultants, Inc. (Rincon) in accordance with the Conditions of Approval: ARCH-0052-2022 (989 Chorro) established by the City of San Luis Obispo Public Works Department on June 1, 2022. The purpose of this AMP is to outline the procedures and protocols for archaeological monitoring.

1.1 Archaeological Monitoring

CoA ARCH-0052-2022 states that the applicant shall provide an archaeological monitoring plan prepared by a City -qualified archaeologist to be implemented during construction. The plan shall identify the qualified professional who will conduct the monitoring and circumstances where a Native American tribal representative or qualified site monitor is required. The plan shall recommend specific procedures for responding to the discovery of archaeological resources during the construction of the project consistent with Section 4.60 of the Archaeological Resources Preservation Program Guidelines (ARPPG). The plan shall be submitted as a part of the building permit (CoA-3 2022).

This document outlines the steps to be taken during unanticipated discoveries to mitigate potential significant impacts, determining when Native American monitoring would become necessary, if it all, and provides methods for determining if and when monitoring may be reduced or eliminated during the course of project execution.

1.2 Project Location and Description

Situated between Mission San Luis Obispo de Tolosa (mission) San Luis Obispo Creek (creek), Mission Plaza is located centrally in downtown San Luis Obispo. It encompasses two bridges, a public restroom building, and the historic Murray Adobe (P-40-040036/contributing resource to the San Luis Obispo Downtown Historic District). The Mission Plaza project site is located within Township 30 South, Range 12 East, Sections 26 and 35 as depicted on the *San Luis Obispo, California* United States Geological Survey (USGS) 7.5-minute topographic map (Figure 1). The project site is south of Mission San Luis Obispo de Tolosa, north of San Luis Obispo Creek, east of Broad Street, and west of Chorro Street (Figure 2).

The City proposes to construct a 504 square foot restroom and a 165 square foot kiosk within Mission Plaza (Plaza). The proposed project would involve the demolition of the existing facilities,

excluding the Murray Adobe. This would include the removal of the restroom building, trellis structure, stone walls, curbs, gutters, sidewalks, existing utilities, and select trees and landscaping within the project site.

The new restroom building will be located southwest of the current restroom building and the kiosk will be located between the Murray Adobe and the new restroom building. A new patio area will be developed in a location consistent with the current patio west of Murray Adobe. The new patio area will be connected to the new restroom building via a set of steps and Americans with Disabilities Act (ADA)- compliant ramp. Following construction of the new restroom building, kiosk, and bar, new hardscaping consisting of pavers laid in a star pattern, landscaping and features to support public use, such as benches, lighting, and drinking fountains, will be installed throughout the project site.

1.3 Archaeological Resource Preservation Program Guidelines

Mission Plaza Concept (Phase I) Restroom and Café: Conditions of Approval No. 3

Archaeological Monitoring: The applicant shall provide an archeological monitoring plan prepared by a City -qualified archeologist to be implemented during construction. The plan shall identify the qualified professional who will conduct the monitoring and circumstances where a Native American tribal representative or qualified site monitor is required. The plan shall recommend specific procedures for responding to the discovery of archeological resources during the construction of the project consistent with 4.60 of the Archaeological Resource Preservation Program Guidelines (ARPPG). The plan shall be submitted as a part of the building permit (Conditions of Approval: ARCH-0052-2022 (989 Chorro).

City of San Louis Obispo Archaeological Resources Preservation Program Guidelines: Monitoring of Construction Activities

Section 4.40.3.2: Archaeological Discoveries During Construction

Site security: Site security shall be maintained by fencing and a resident caretaker or private professional security personnel, or other appropriate method to protect the resources from unauthorized collection to the Director's approval. Site security measures shall be provided at the project applicant's expense (City of San Luis Obispo 2009).

4.60.1. Notification

If during the course of a project, archaeological materials are identified by the project archaeologist, archaeological monitor, tribal representative, City staff member, the project applicant or his/her representative or employee, all construction activities that may disrupt those materials shall cease. The Director shall be notified immediately of the discovery of archaeological materials. Refer to Section 4.40.3.2 on Discovery of Human Remains (City of San Luis Obispo 2009).

4.60.2. Field Study

Under most circumstances, the project applicant will be directed to retain a qualified professional archaeologist to immediately visit the site, evaluate the materials recovered and provide a written report to the Director recommending the appropriate course of action.

4.60.3. Mitigation

If significant archaeological resources are present, the archaeologist shall propose specific mitigation measures in writing. The Community Development Director (Director) may approve, approve with changes or reject the mitigation proposal. The project applicant shall implement the proposal, to the satisfaction of the Director. A copy of the archaeologist's recommendations and the Director's decision will be forwarded to the Cultural Heritage Committed (CHC), (City of San Luis Obispo 2009).

1.4 Cultural Resource Sensitivity

Cultural Background

The project site is within a known archaeological site (CA-SLO-2341H), as well as the City's Downtown Historic District, and adjacent to Mission San Luis Obispo de Tolosa (CA-SLO-64/H). The City's Archaeological Resource Preservation Program Guidelines (ARPPG) define archaeologically sensitive areas as those locations inside or within 200 feet of the boundaries of a known archaeological site; properties within 200 feet of the top of banks of major creeks; and areas inside a designated Historical District as shown on archaeological sensitivity maps on file at the Community Development Department (City of San Luis Obispo 2009).

Rincon understands a categorical exemption was conducted for the project and there were Conditions of Approval for the building permit. The current project is located in the City of San Luis Obispo in close proximity to the Mission San Luis Obispo de Tolosa and approximately 11 meters north of the San Luis Obispo Creek. The presence of recorded archaeological resources and proximity of historical buildings increases the likelihood of encountering historic-period archaeological deposits within the project site. The presence of subsurface deposits is also suspected according to recent studies performed by Applied Earthworks (2020). Given the project is within areas determined to be sensitive for archaeological resources the CoAs is requiring archaeological monitoring during construction.

CA-SLO-2341H

Sie CA-SLO-2341H represents the Mission Plaza and the Historic Downtown District. Both of these historic built environments are located in and/or near a sensitive archaeological (prehistoric and historic) resources area. The area consists of multiple subsurface Mission and historic-period refuse/trash pits. Examinations of these pits have identified various types and kinds of colored and uncolored glass objects (intact and fragments), cooking utensils, porcelain (fragments), ceramic roofing titles (intact and fragments), and wire nails. The Mission Plaza and the Historic Downtown District are on the City of San Luis Obispo Master List of Historic Resources and is considered a historical resource under the California Environmental Quality Act (CEQA). Given the sensitivity of the area, past work in proximity to CA-SLO-2341H has required monitoring. Most recently, Applied Earthworks, Inc. completed an Archaeological Monitoring Plan for the project in April 2020 (Wathen and Long 2020). The plan identified one historic-period archaeological resource (CA-SLO-2341H) mapped within the project site.

San Luis Obispo Downtown Historic District

In addition to CA-SLO-2341H, the Applied Earthworks plan further identified that the project site lies within the locally designated San Luis Obispo Downtown Historic District, which includes many of

the City's most important historic buildings with a variety of architectural styles (Wathen and Long 2020). Within the Historic District are Mission San Luis Obispo and Murray Adobe. The Murry Adobe, erected by Walter Murray in 1850, was used to store the Tribune newspaper's printing press. The Murray Adobe is situated roughly 30 meters north of the planned new restrooms. Despite undergoing multiple alterations since its construction, the adobe now represents only a fraction of its original structure. Nevertheless, it has undergone restoration efforts to return it to its initial design (Wathen and Long 2020). The Murray Adobe is on the City of San Luis Obispo Master List of Historic Resources and is considered a historical resource under the California Environmental Quality Act (CEQA).

CA-SLO-64/H

Resource CA-SLO-64/H encompasses a significant historical area, including the Mission San Luis Obispo de Tolosa and associated archaeological deposits. This historic resource encapsulates remnants and features linked to the mission itself, as well as historical traces of Native American and Chinese occupations. Additionally, it includes deposits from the Victorian era that are spread across a considerable area along Higuera, Monterey, and Palm streets. This designation highlights the rich and diverse historical layers present in the vicinity (Wathen and Long 2020).

2 Monitoring Procedures

2.1 Archaeological Construction Monitoring Requirements

In accordance with CoA-3, archaeological monitoring is required for all project-related ground disturbance. Archaeological monitoring efforts shall be conducted under the direction of a City-qualified archaeologist who meets the Secretary of the Interior's Professional Qualifications Standards for prehistoric and historic archaeology (National Park Service [NPS] 1983; hereafter, Qualified Archaeologist). The monitoring methods provided in this plan are designed to comply not only with CoA-3, but also remain consistent with the City's ARPPG-4.60-1, 4.60-2, and 4.60-3 (City of San Luis Obispo 2009).

Archeological Monitoring Duties

An archaeological monitor shall be onsite during project-related earthmoving activities. Earthmoving activities include, but are not limited to, vegetation removal, grading, boring, excavation, trenching, and all other excavation activities. During monitoring, the monitor(s) shall examine the work areas for the presence of prehistoric artifacts (e.g., chipped stone tools and production debris, stone milling tools, ceramics), historic-period debris (e.g., metal, glass, housewares, ceramics, construction materials), and/or soil discoloration that might indicate an archaeological deposit or feature, as specified in ARPPG-4.60-1, 4.60-2, and 4.60-3 (City of San Luis Obispo 2009).

Daily Archaeological Monitoring Log

The archaeological monitor shall maintain a daily log documenting ground disturbing activity, work locations, description and provenience of any archaeological discoveries (if any), and any necessary action items for monitoring. The monitoring forms shall be submitted to the City as an attachment to the archaeological construction monitoring report

Archaeological Construction Monitoring Report

The qualified archaeologist will prepare an Archaeological Construction Monitoring Report (ACMR) that will outline the methods and results of the archaeological construction monitoring effort. The report will include maps, photographs and will include the daily monitoring logs completed by the construction archaeological monitor (City of San Luis Obispo 2009).

Unanticipated Discovery of Cultural Resources

In the event of anticipated discovery of cultural (prehistoric or historic) resources the archaeological monitor retains the authority to temporarily halt and redirect work until the resource(s) have been evaluated and the area cleared for construction activities to recommence**.** If the archaeological resource is prehistoric in nature, a local Native American group will be contacted and given the opportunity consult with the City regarding the find and provide recommendations. A Native American monitor will be retained for the remainder of earth disturbing activities should a

prehistoric resource be found during construction (City of San Luis Obispo 2009). Recovery protocols in the case of a find are discussed in greater detail in Section 3 below.

2.1.5 Duration of Archaeological Monitoring

Monitoring shall continue until the Qualified Archaeologist, in coordination with the City (and Native American monitor if present), has determined that the monitoring may be reduced or eliminated. In accordance with CoA-3 and ARPPG-3, when/if culturally sterile soils are encountered during monitoring, the Qualified Archaeologist will provide a written recommendation (via email or other method acceptable to the City) to reduce or eliminate the monitoring effort. Should the City accept the recommendation, the reduction or elimination will commence immediately upon approval (City of San Luis Obispo 2009).

3 Archaeological Resources Discovery Plan

The following outlines the procedures to be followed in the inadvertent discovery of cultural resources, including human remains.

3.1 Discovery of Archaeological Resources

In accordance of CoA-3 and ARPPG, the procedure for appropriately evaluating unanticipated resources encountered during construction will include, but not be limited to, the following:

For the discovery of previously unknown archaeological (prehistoric or historic) resources: The archaeological monitor will divert construction activity in the immediate vicinity of the find by signaling to construction staff and notifying the designated construction foreman. The archaeological monitor will report the discovery to the qualified archaeologist and the City's construction inspector. The "immediate vicinity" will vary depending upon specific circumstances. If the archaeological resource is prehistoric in nature, a local Native American group will be contacted to consult about the find, and a Native American monitor will be retained for the remainder of earth disturbing activities (City of San Luis Obispo 2009).

Upon completion of the above notification, the archaeological monitor will determine the nature and extent of the archaeological remains and make a preliminary assessment of their integrity and potential importance. If the archaeological monitor determines that the discovery is not cultural, or is a single isolated artifact, the monitor will immediately notify the qualified archaeologist, the City, and construction superintendent that activities may resume as soon as the archaeological item(s) has been properly photographed and recorded (City of San Luis Obispo 2009).

If potentially significant cultural features, artifact concentrations, or intact deposits are discovered, the archaeological monitor will divert construction activities away from the find and report the discovery to the qualified archaeologist, the City, and the construction superintendent, so that appropriate notifications to the City can be issued (City of San Luis Obispo 2009).

A temporary Construction Exclusion Zone (CEZ), consisting of lath and flagging tape, will be erected around the discovery. A radius of 50 feet may be established so that the resource may be evaluated. However, the size of the CEZ may be reduced or enlarged as the significance and extent of the find is determined and treatment measures are implemented, and for safety (City of San Luis Obispo 2009).

A minimum 50-foot radius shall also be established for any remains that are suspected of being human (see Section 3.2 for further direction related to the discovery of human remains). Isolated artifacts shall be marked by an orange cone or flagging with no additional radius. The CEZ will not be removed until the potentially significant cultural resource has been evaluated to assess whether it is considered a "historical resource," pursuant to the California Environmental Quality Act (CCR, § 15064.5[a]). To minimize construction delays, if a potentially significant cultural resource is discovered during monitoring, the qualified archaeologist will immediately contact the City to formulate a plan for further treatment. If necessary, the evaluation may require archaeological testing for California Register of Historical Resources (CRHR) eligibility. If the discovery proves to be eligible for the CRHR and cannot be avoided by the modified project, additional work, such as data

recovery excavation, may be warranted to mitigate any significant impacts to historical resources (City of San Luis Obispo 2009).

Archaeological (prehistoric or historic) resources identified within the site shall be recorded according to current archaeological standards (California Office of Historic Preservation 1990) and in compliance with City Guidelines (City of San Luis Obispo 2009). This shall include the preparation of California Department of Parks and Recreation (DPR) Series 523 forms.

Pertinent information concerning the resource(s) shall be recorded, including the site type, components, size, and provenience. Upon completion, the Series 523 forms shall be submitted to the California Historical Resources Information System's Central Coast Information Center, located at the Santa Barbra Museum of Natural History for primary number and trinomial designation. Final copies of the Series 523 forms shall be included in the final monitoring report. In addition to the Series 523 forms, a final compliance report shall be prepared as presented in Section 4.1 below. If the report discusses archaeological resources, it will be considered confidential (City of San Luis Obispo 2009).

3.2 Discovery of Human Remains

There is a possibility that the project's construction-related activities may encounter human remains. Therefore, in accordance with CoA-3 and 4.40.3.2, if the project's construction-related activities find potential human bone or remains, ground-disturbing activities in the area of the discovery shall ***immediately*** be halted and redirected while a temporary CEZ surrounding the site of discovery is established to allow for further examination and treatment of the find (City of San Luis Obispo 2009). The qualified archaeologist shall also ***immediately*** notify the City and the San Luis Obispo County Coroner's Office by telephone, pursuant to Health and Safety Code 7050.5. By law, the Coroner will determine within 48 hours of being notified if the remains are subject to his or her authority. If the human remains are determined to be prehistoric, the coroner will notify the Native American Heritage Commission, which will determine and notify a most likely descendant (MLD). The MLD shall complete the inspection of the site within 48 hours of being granted access and provide recommendations for the treatment of any human remains and artifacts associated with Native American burials.

4 Reporting of Monitoring Results and Curation Finds

4.1 Reporting of Archaeological Monitoring Results

At the conclusion of the monitoring effort, the Archaeological Monitoring Plan (AMP) will be prepared under the direction of the qualified archaeologist. The monitoring report will outline the monitoring methods employed, describe the construction activity and duration, and present the results of the monitoring. The level of effort to complete a monitoring report is dependent on the number of resources recovered during monitoring activities. Should the monitoring effort be negative for the identification of cultural resources, a negative letter report shall be prepared. The letter report shall include, at a minimum, the dates of monitoring, activities conducted, personnel, and field logs (City of San Luis Obispo 2009).

If archaeological materials are identified, a comprehensive technical report will be required to describe and interpret findings and data. The technical report shall be prepared in accordance with the Archaeological Resources Management Reports (ARMR): Recommended Contents and Format and City Guidelines (California Office of Historic Preservation 1990 and City of San Luis Obispo 2009). If required, the ARMR-format report shall include a complete description of resources identified during monitoring, treatment of those resources, California Register for Historic Resources (CHHR) eligibility recommendations, site records, and site maps. If the report discusses archaeological resources, it will be considered confidential (City of San Luis Obispo 2009).

The final version of the monitoring report shall be submitted to the City and the Central Coast Information Center of the California Historical Resources Information Center.

4.2 Curation of Archaeological Finds

Recovered archaeological finds not associated with burials will be temporarily stored by the qualified archaeologist at a secured off-site laboratory, until either an appropriate on-site reburial location not subject to future ground disturbance or repository is agreed upon by the City, other interested Native American groups, and/or MLD.

If the qualified archaeologist, in consultation with the Native American representative (if applicable), and the City, is unable to bury newly discovered isolated artifacts within the project boundaries, the qualified archaeologist will secure a written agreement with a recognized museum repository or comparable institution that meets the State of California Guidelines for the Curation of Archaeological Collections (National Park Service 1993) such as the Repository for Archaeological and Ethnographic Collections at the University of California, Santa Barbara, or San Luis Obispo County Archaeological Society (SLOCAS) Collections regarding the final disposition, permanent storage, and maintenance of any archaeological resources discovered during archaeological monitoring and determined not to be ceremonial and/or cultural artifacts.

Permanent treatment of human remains and associated funerary items shall be determined by the City in consultation with the MLD (City of San Luis Obispo 2009).

5 References

California Office of Historic Preservation

1990 Archaeological Resource Management Reports (ARMR) Recommended Contents and Format. https://ohp.parks.ca.gov/pages/1069/files/armr-remediated.pdf , accessed July 6, 2023.

City of San Luis Obispo

2022 City of San Luis Obispo Public Works Department Community Development: Conditions of Approval ARCH-0052-2022 (989 Chorro) for the Mission Plaza Concept Plan (Phase I) - Restroom and Café. On file at City Hall. On file at City Hall.

City of San Luis Obispo

2009 Archaeological Resource Preservation Program Guidelines. https://www.slocity.org/home/showpublisheddocument/4140/635497649652000000, accessed July 6, 2023.

National Park Service

1983 Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines. Washington, DC. https://www.nps.gov/history/local-law/arch_stnds_0.htm, accessed April 1, 2022.

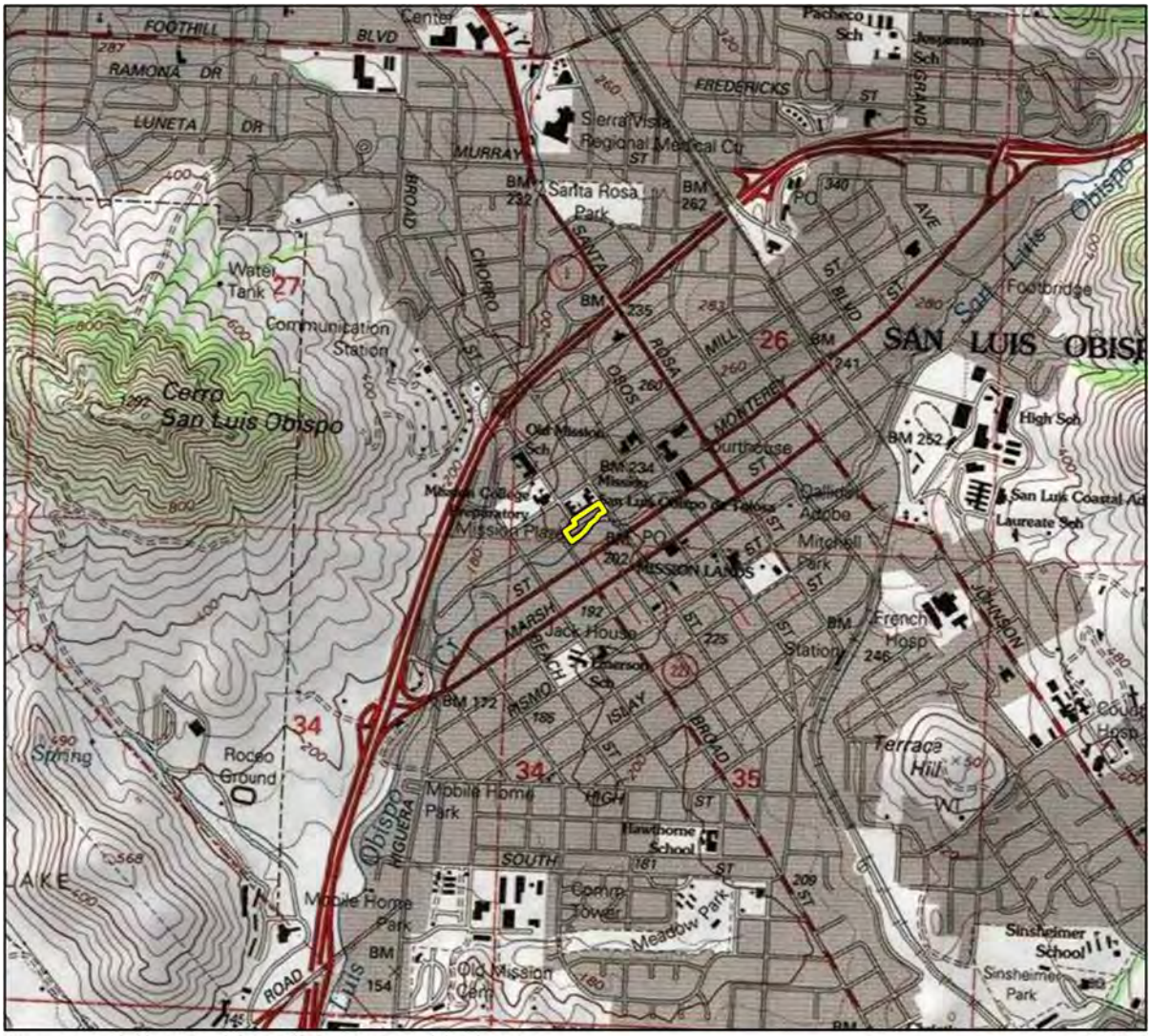
Wathen and Long

2020 Applied Earth Works, Inc.: Mission Plaza Archaeological Monitoring Plan City of San Luis Obispo, California.

Attachment 1

Figures

Figure 1 Project Topographic and Vicinity Map



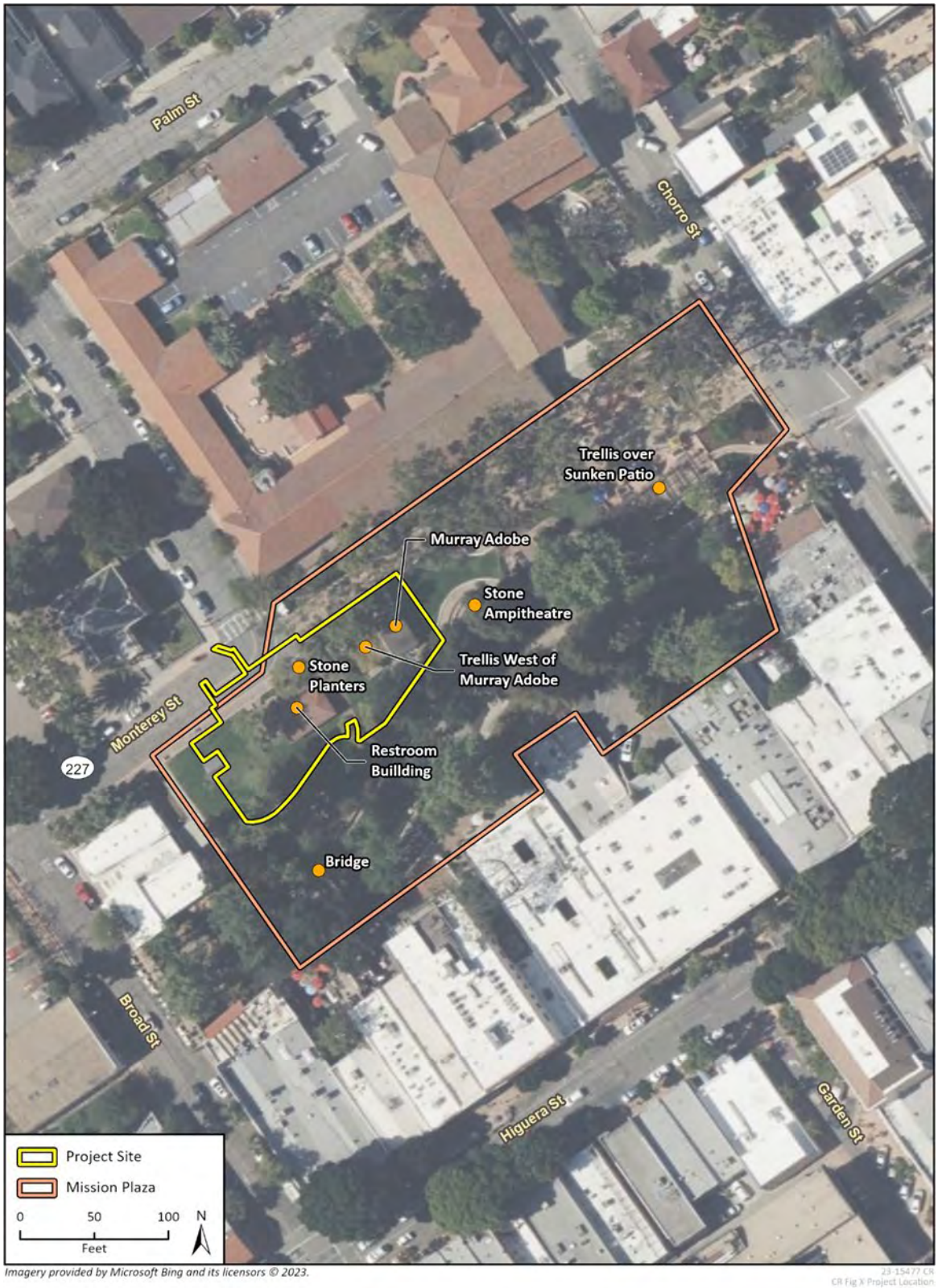
Basemap provided by National Geographic Society, Esri and their licensors © 2023. San Luis Obispo Quadrangle. T30S R12E S26, 35. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographic map was assembled.

Project Location

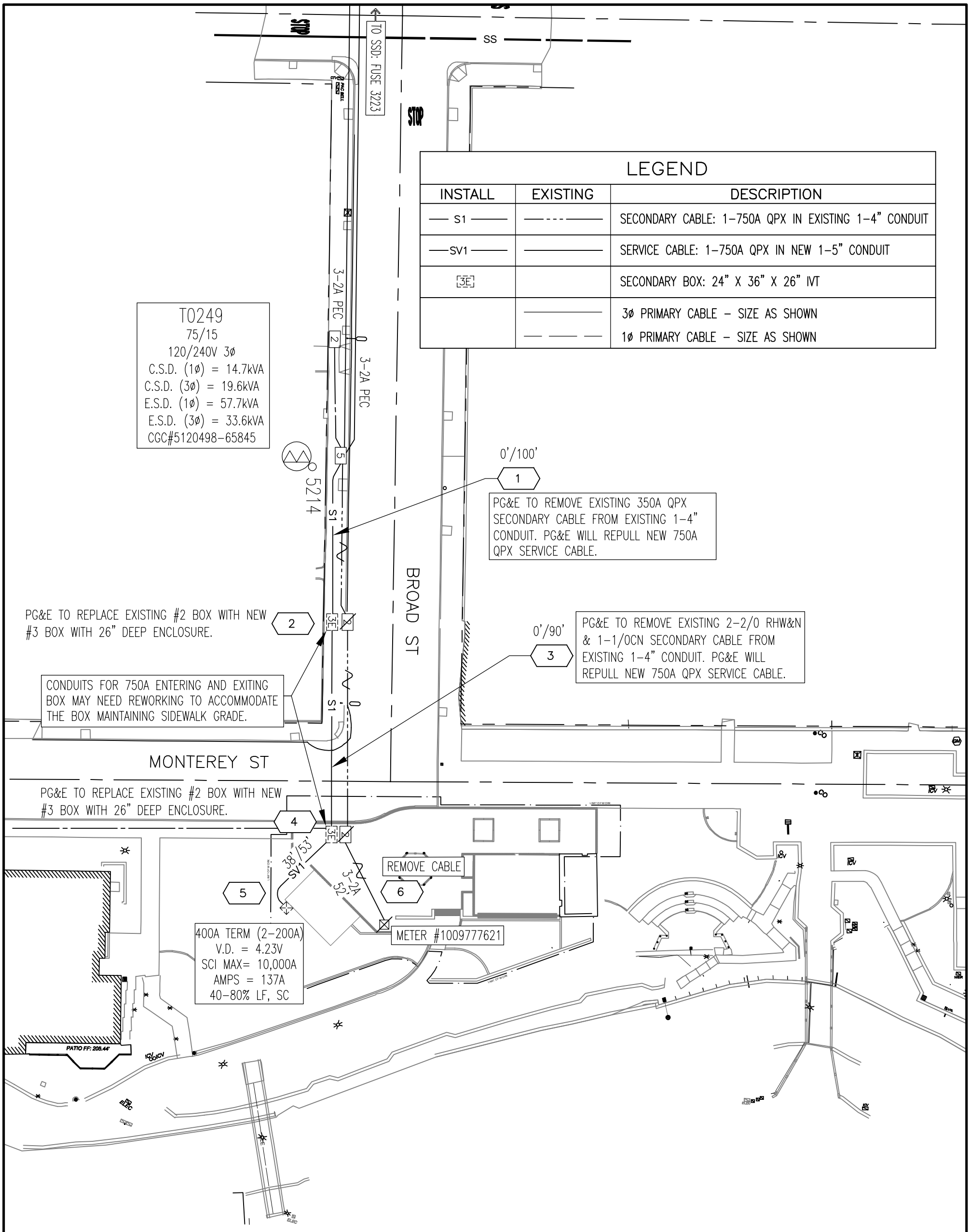
0 1,000 2,000 Feet

N

Figure 2 Project Site Within the Mission Plaza



APPENDIX F – PG&E HANDOUT PACKAGE



---WORK AGENT RESPONSIBILITIES---

PG&E TO INSTALL ALL ELECTRIC FACILITIES
APPLICANT TO TRENCH & INSTALL ALL CONDUIT & SUBSTRUCTURES

PRIMARY VOLTAGE: 12 kV	VOLTAGE AREA: 2	CONSTRUCTION SKETCH 989 CHORRO STREET SAN LUIS OBISPO	EST: MARCUS OWEN 559-254-3043
LATITUDE: 35.280144	LONGITUDE: -120.66486		ADE: MICHAEL STEWART 559-207-4837
SOURCE SIDE DEVICE: FUSE 3223			SUPV: HENRY DIAZ
SUB & CIRCUIT: GOLDTREE 1108			REP: JUSTIN MCDONALD 805-546-1271
DSGN SAG: N/A	RAPTOR ZONE: YES		PLNR: N/A -
LOADING AREA: LIGHT	ARRESTER DIST: 2	811 Know what's below. Call before you dig. / ENVIRONMENTAL ISSUES	NOTIF: 124816031 JPA#: N/A
CORROSION AREA: MODERATE	INSULATION DIST: A		SCALE: 1"=40' DATE: 5/19/2023
EXEMPT EQUIP.INST.: NO	FIRE AREA: LRA-TIER 1	GAS CONFLICT: IN PROXIMITY NEAR LOC:	PM: 35415945 SHEET: 1 OF 1 REV. 0

APPENDIX G – ASBESTOS TESTING REPORT

WEST COAST
SAFETY
CONSULTANTS

June 29, 2023

Nathan Garcia Nava
City of San Luis Obispo
919 Palm Street
San Luis Obispo, CA

RE: Asbestos Building Inspection – 751 Palm Street, San Luis Obispo, California

INTRODUCTION

This report presents the findings of West Coast Safety Consultants inspection for asbestos containing building materials at the Mission Plaza Restroom located at 751 Palm Street, San Luis Obispo, California on June 23, 2023. The 400 square foot building is constructed of concrete block and rests on a concrete slab foundation. All accessible areas were visibly inspected and samples of suspect material were obtained and analyzed.

Our survey involved sampling and analyzing suspect materials to test for the presence of asbestos. A detailed description of the work is outlined below.

1. Inspected all accessible areas of the building for Category I Non-friable, Category II Non-friable, and other Regulated Asbestos Containing Materials. Samples were collected recording:

    a. Sample location
    b. Sample description
    c. Friability
    d. Condition of the material
    e. Potential for disturbance

2. Submitted samples to an EPA accredited laboratory which will provide a report containing the following:

    a. West Coast Safety Consultants sample identification number
    b. Laboratory sample identification number
    c. Analytical technique
    d. Quality control procedures
    e. Type and percentage of asbestos in each material

3. Analyzed the sample results and generated this report which includes:

   a. Definitions
   b. Executive Summary
   c. Findings
   d. Conclusions and Recommendations
   e. Sample Result Summary (Appendix A)
   f. Sample Location Diagram (Appendix B)
   g. Laboratory Report (Appendix C)
   h. Inspectors Credentials (Appendix D)

DEFINITIONS

Asbestos
Types of asbestos include chrysotile, amosite, crocidolite, tremolite, anthophyllite, actinolite and any of these minerals that have been chemically treated and/or altered.

Asbestos Containing Material (ACM)
Any material containing more than one percent asbestos.

Category I Non-friable ACM
Asbestos containing packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1 percent asbestos as determined using the method specified in Appendix A, Subpart F, 40 CFR Part 763, Section 1, Polarized Light Microscopy (PLM).

Category II Non-friable ACM
Any non-friable material, excluding Category I Non-friable ACM, containing more than 1% asbestos as determined using PLM.

Friable ACM
Any material containing more than 1% asbestos as determined using PLM that when dry can be crumbled, pulverized, or reduced to powder by hand pressure.

NESHAPS
The National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61).

Regulated Asbestos Containing Material (RACM)
Any material containing more than 1% asbestos which is:

   a. Friable or;

   b. Category I Non-friable ACM that has become friable or;

   c. Category I Non-friable ACM that will be or has been subjected to sanding, grinding, cutting, abrading or;

   d. Category II ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to a powder by the forces expected to act on the material in the course of demolition.

EXECUTIVE SUMMARY

MATERIALS WHICH CONTAIN ASBESTOS:

No asbestos containing materials were identified.

SUSPECT MATERIALS WHICH NO ASBESTOS WAS DETECTED:

Plaster located on the interior walls was sampled and no asbestos was detected in any of the samples.

Cementitious Coating located on the exterior walls was sampled and no asbestos was detected in any of the samples.

Concrete Slab was sampled and no asbestos was detected.

Tar/Felt located on the roof (under tile) was sampled and no asbestos was detected.

FINDINGS

West Coast Safety Consultants collected samples of each suspect asbestos containing building material (ACBM) encountered at the specific site location. The Environmental Protection Agency (EPA) sampling protocol was utilized which requires multiple samples of suspect asbestos containing materials which are applied by spraying or troweling. A total of six samples were submitted to SGS Forensic Laboratories, an EPA accredited laboratory for analytical testing. Laboratory results are found in appendix C of this report. The samples were analyzed for the presence of asbestos by Polarized Light Microscopy (PLM) with dispersion staining in accordance with the EPA Method 600/R-93-116, Visual Area Estimation.

Of the six samples that were analyzed for asbestos, none were found to contain asbestos. No other asbestos containing materials were identified.

CONCLUSIONS AND RECOMMENDATIONS

No asbestos containing materials were identified on the inspection. If additional suspect materials are discovered during demolition or renovation activities, the material should be assumed to contain asbestos until sampling proves otherwise.

The San Luis Obispo County Air Pollution Control District is delegated authority to implement the asbestos NESHAP regulation in San Luis Obispo County. This regulation requires specific actions by the Owner or Operator of applicable projects. Before you begin your project and for further information, please visit their web site at: https://www.slocleanair.org/rules-regulations/asbestos.php or call the Engineering and Compliance Division at (805) 781-5912.

These conclusions and recommendations are based on the requirements set forth in 40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants (NESHAP), and Title 8, Chapter 4, Paragraph 1529, the Asbestos Standard of the California Occupational Safety and Health Administration.

CLOSURE

The findings and conclusions rendered in this report are opinions based on the scope of work authorized by the client and laboratory analysis of building material samples collected during this inspection. This report does not reflect variations which may exist between sampling points. These variations cannot be anticipated, nor could they be entirely accounted for, in spite of exhaustive additional testing. Our work has been performed in accordance with generally accepted practices in the field of asbestos consultation. No other warranty, either expressed or implied is made.

Although every effort is made to identify all the asbestos containing materials in a building, it is possible for asbestos containing materials which are located under sub-floors, behind walls or otherwise hidden from view to go undetected until demolition or renovation activities uncover the material. If additional suspect materials are discovered, West Coast Safety Consultants will collect samples and provide a report for no additional cost other than the laboratory fee for sample analysis.

Enclosed with this report is a sample result summary, sample location diagram, a laboratory report from SGS Forensic Laboratories and a copy of my asbestos certificate. I appreciate this opportunity to be of service. Should you have any questions or comments regarding this report, please contact this office at your convenience.

West Coast Safety Consultants,

Michael Mc Guire
Certified Asbestos Consultant (#92-0534)

APPENDIX A

ASBESTOS SAMPLE RESULT SUMMARY

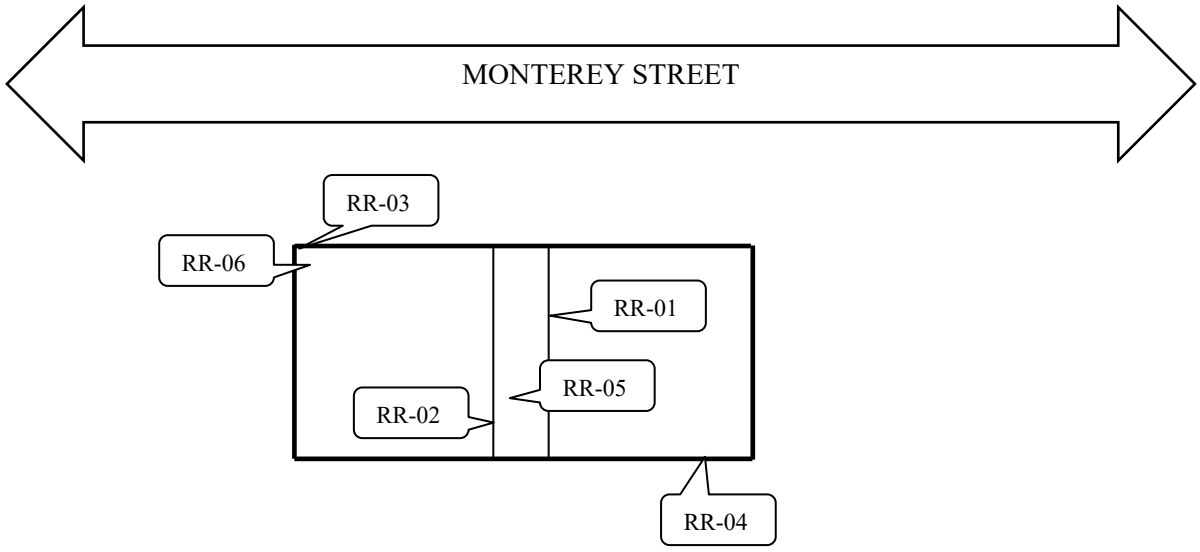
Sample #	Material	Location	Asbestos Content
RR-01	Plaster	Woman's Restroom Wall	None Detected
RR-02	Plaster	Men's Restroom Wall	None Detected
RR-03	Cementitious Coating	Exterior Wall	None Detected
RR-04	Cementitious Coating	Exterior Wall	None Detected
RR-05	Concrete Slab	Utility Room	None Detected
RR-06	Tar/Felt	Roof (under tile)	None Detected

APPENDIX B

SAMPLE LOCATION DIAGRAM

751 Palm Street

San Luis Obispo, California



APPENDIX C

LABORATORY REPORTS

Forensic Analytical Laboratories, Inc.

Analysis Request Form (COC)

Client Name & Address:
WEST COAST SAFETY CONSULTANTS
(ACCT # 5318)
4581 WAVERTREE
SAN LUIS OBISPO, CA 93405

PO / Job#:

Date: 6/23/23

Turn Around Time: Same Day / (1Day) / 2Day / 3Day / 4Day / 5Day

☐ PCM: ☐ NIOSH 7400A / ☐ NIOSH 7400B ☐ Rotometer

☒ PLM: ☒ Standard / ☐ Point Count 400 - 1000 / ☐ CARB 435

Contact: MICHAEL MCGUIRE

Phone: (805) 748-8832 Fax:

E-mail: SLOSAFETYMAN@YAHOO.COM

☐ TEM Air: ☐ AHERA / ☐ Yamate2 / ☐ NIOSH 7402
☐ TEM Bulk: ☐ Quantitative / ☐ Qualitative / ☐ Chatfield
☐ TEM Water: ☐ Potable / ☐ Non-Potable / ☐ Weight %
☐ TEM Microvac: ☐ Qual(+/-) / ☐ D5755(str/area) / ☐ D5756(str/mass)

☐ IAQ Particle Identification (PLM LAB) ☐ PLM Opaques/Soot
☐ Particle Identification (TEM LAB) ☐ Special Project

Site: MISSION PLAZA RESTROOM

Site Location: 751 PALM ST, SAN LUIS OBISPO

☐ Metals Analysis: Method:

Matrix:

Analytes:

Comments: NATHAN GARCIA NAVA

Report Via: ☐ Fax ☒ E-Mail ☐ Verbal

Sample ID	Date / Time	Sample Location / Description	FOR AIR SAMPLES ONLY: Type	Time On/Off	Avg. LPM	Total Time	Sample Area / Air Volume
RR-01	6/23/23	INTERIOR WALL / PLASTER	A P C				
RR-02		" / "	A P C				
RR-03		EXTERIOR WALL / COATING	A P C				
RR-04		" / "	A P C				
RR-05		UTILITY ROOM / CONCRETE SLAB	A P C				
RR-06		ROOF / FELT	A P C				
			A P C				
			A P C				
			A P C				
			A P C				

Sampled By: MICHAEL MCGUIRE M.M.M. Date: 6/23/23 Time: 10:00 AM

Shipped Via: ☒ Fed Ex ☐ DHL ☐ UPS ☐ US Mail ☐ Courier ☐ Drop Off ☐ Other:

Relinquished By: MICHAEL MCGUIRE	Relinquished By:	Relinquished By:
Date / Time: 6/23/23 @ 1:50 PM	Date / Time:	Date / Time:
Received By: FW5633	Received By:	Received By:
Date / Time: 1130	Date / Time:	Date / Time:
Condition Acceptable? ☐ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No

RECEIVED
JUN 26 2023

San Francisco Office: 3777 Depot Road, Suite 409, Hayward, California 94545-2761 / Ph: (510)887-8828 * (800)827-3274 / Fax: (510)887-4218
Los Angeles Office: 2959 Pacific Commerce Drive, Rancho Dominguez, California 90221 / Ph: (310)763-2374 * (888)813-9417 / Fax: (310)763-4450
Las Vegas Office: 6765 S. Eastern Avenue, Suite 3, Las Vegas, Nevada 89119 / Ph: (702)784-0040 / Fax: (702)784-0030

SGS FORENSIC LABORATORIES

Final Report

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

West Coast Safety Consultants
Michael McGuire

4581 Wavertree
San Luis Obispo, CA 93401

Client ID: 5318
Report Number: B348986
Date Received: 06/26/23
Date Analyzed: 06/26/23
Date Printed: 06/27/23
First Reported: 06/27/23

Job ID/Site: Mission Plaza Restroom - 751 Palm St San Luis Obispo

Date(s) Collected:

SGSFL Job ID: 5318
Total Samples Submitted: 6
Total Samples Analyzed: 6

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
RR-01	12674116						
Layer: Grey Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
RR-02	12674117						
Layer: Grey Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
RR-03	12674118						
Layer: Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
RR-04	12674119						
Layer: Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
RR-05	12674120						
Layer: Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
RR-06	12674121						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components: Cellulose (65 %)		**Asbestos (ND)**					

3777 Depot Road, Suite 409, Hayward, CA 94545 | Phone: 510.887.8828 / 800.827.3274 Fax: 510.887.4218 | https://falaboratories.sgs.com

Report Number: B348986

Client Name: West Coast Safety Consultants **Date Printed:** 06/27/23

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer

Maria Cosper, Laboratory Supervisor, Hayward Laboratory

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

3777 Depot Road, Suite 409, Hayward, CA 94545 | Phone: 510.887.8828 / 800.827.3274 Fax: 510.887.4218 | https://falaboratories.sgs.com

APPENDIX D

ASBESTOS CERTIFICATION

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Michael L McGuire
Name

Certification No. **92-0534**

Expires on **08/14/23**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

APPENDIX H – LEAD TESTING REPORT

WEST COAST
SAFETY
CONSULTANTS

June 29, 2023

Nathan Garcia Nava
City of San Luis Obispo
919 Palm Street
San Luis Obispo, CA

RE: Lead Building Inspection – 751 Palm Street, San Luis Obispo, California

INTRODUCTION

This report presents the findings of West Coast Safety Consultants inspection for lead containing materials at the Mission Plaza Restroom located at 751 Palm Street, San Luis Obispo, California on June 23, 2023. The inspection was conducted for CAL-OSHA and EPA compliance in conjunction with the renovation/demolition of the building. All accessible areas were visibly inspected and representative samples of suspect materials were obtained and analyzed. Samples were not collected from every painted surface, however samples were obtained which represent the majority of the painted surfaces at the specific site location.

LEAD SAMPLE ANALYSIS

The survey involved a visual inspection of the building and sample collection from painted surfaces and ceramic tile. The samples were analyzed by SGS Forensic Laboratories using Flame Atomic Absorption in accordance with the Environmental Protection Agency (EPA) Method (3050B/7420) to identify lead content. SGS Forensic Laboratories is a laboratory which is certified to analyze for lead. They are accredited by the American Industrial Hygiene Association, the National Institute of Standards and Technology, and the California Department of Public Health (CDPH). Please note the attached laboratory report.

LEAD FINDINGS

West Coast Safety Consultants visual inspection identified that the painted surfaces were intact and in good condition. A total of seven samples were collected and analyzed for lead content. The results in parts per million (ppm) are as follows:

Sample#	Location	Description	Lead Content
RR-101	Interior Block Wall	Beige Paint	None Detected
RR-102	Exterior Block Wall	Beige Paint	None Detected
RR-103	Exterior Block Wall	Beige Paint	None Detected
RR-104	Exterior/Interior Window Frame	Brown Paint	None Detected
RR-105	Exterior/Interior Door/Door Frame	Brown Paint	None Detected
RR-106	Exterior Beam/Eave/Fascia	Brown Paint	480 ppm
RR-107	Interior Wall	Ceramic Tile	None Detected

As a comparison, the EPA and CDPH consider a material to be lead based paint when it exceeds .5% or 5,000 ppm. In addition, the Consumer Product Safety Commission (CPSC) set a limit of .009% or 90 ppm of lead in paint for children's toys and CAL-OSHA regulates workers who disturb lead coated surfaces at any detectable lead level.

SUMMARY

No lead was detected in the samples collected from the following building components:

1. Interior/Exterior Painted Walls
2. Interior Ceramic Tiled Walls
3. Interior/Exterior Painted Window Frames
4. Interior/Exterior Painted Door/Door Frame

A low level of lead (480 ppm) was detected in the sample collected from the painted exterior beams/eaves/fascia.

West Coast Safety Consultants recommends any contractor conducting work which will disturb painted surfaces or ceramic tile receive notification of the lead content and the condition of the lead containing surfaces prior to demolition, renovation, or any activity which would disturb the material. All work should be conducted in compliance with the CAL-OSHA and EPA regulations.

CLOSURE

The findings and conclusions rendered in this report are based on the scope of work authorized by the client and laboratory analysis of building material samples collected during this inspection. This report does not reflect variations which may exist between sampling points. These variations cannot be anticipated, nor could they be entirely accounted for even with exhaustive testing. All work has been performed in accordance with generally accepted practices in the field of lead consultation.

The conclusions and recommendations listed in this report are based on the Department of Housing and Urban Development *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, 40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants (NESHAP), and Section 1532.1 the Lead Standard of the California Occupational Safety and Health Administration.

I have enclosed the required CDPH Notification of a Lead Inspection, a laboratory report from SGS Forensic Laboratories, a sample location diagram and a copy of my lead credentials. If you have any questions, please contact me at 805-748-8832. Thank you for choosing West Coast Safety Consultants.

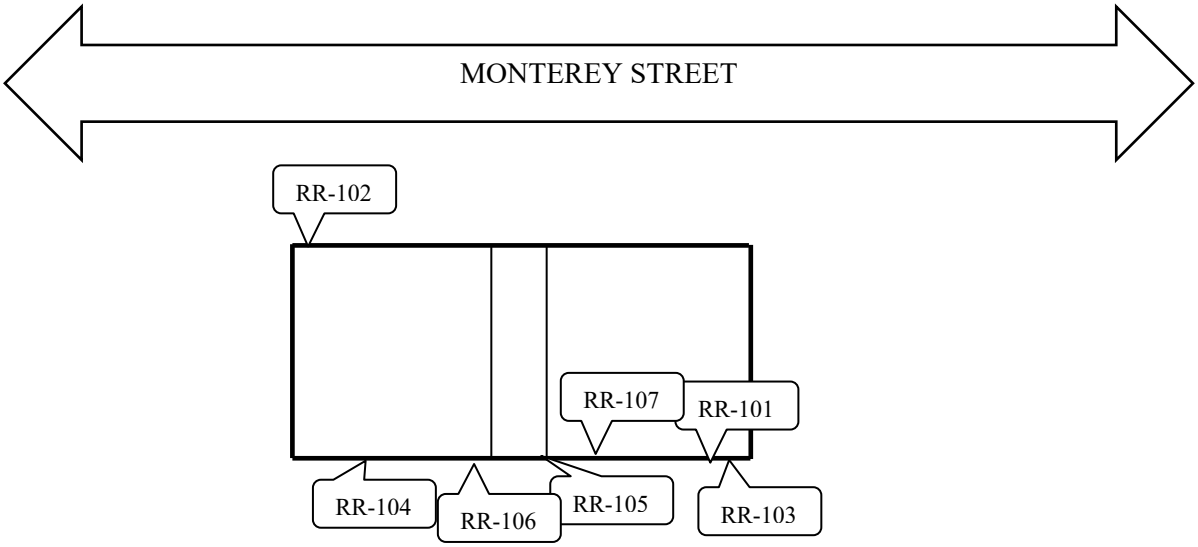
Sincerely,

Michael Mc Guire
CDPH Lead Certification LRC-00002166

SAMPLE LOCATION DIAGRAM

751 Palm Street

San Luis Obispo, California



Forensic Analytical Laboratories, Inc.

Analysis Request Form (COC)

Client Name & Address:
WEST COAST SAFETY CONSULTANTS
(ACCT # 5318)
4581 WAVERTREE
SAN LUIS OBISPO, CA 93405

PO / Job#:

Date: 6/23/23

Turn Around Time: Same Day / 1Day / (2Day) / 3Day / 4Day / 5Day

☐ PCM: ☐ NIOSH 7400A / ☐ NIOSH 7400B ☐ Rotometer

☐ PLM: ☐ Standard / ☐ Point Count 400 - 1000 / ☐ CARB 435

Contact: MICHAEL MCGUIRE

Phone: (805) 748-8832 Fax:

☐ TEM Air: ☐ AHERA / ☐ Yamate2 / ☐ NIOSH 7402
☐ TEM Bulk: ☐ Quantitative / ☐ Qualitative / ☐ Chatfield
☐ TEM Water: ☐ Potable / ☐ Non-Potable / ☐ Weight %
☐ TEM Microvac: ☐ Qual(+/-) / ☐ D5755(str/area) / ☐ D5756(str/mass)

E-mail: SLOSAFETYMAN@YAHOO.COM

☐ IAQ Particle Identification (PLM LAB) ☐ PLM Opaques/Soot
☐ Particle Identification (TEM LAB) ☐ Special Project

Site:

☒ Metals Analysis: Method:

Matrix: PAINT & CERAMIC TILE

Site Location: 751 PALM ST., SAN LUIS OBISPO

Analytes: LEAD

Comments: NATHAN GARCIA NAVA

Report Via: ☐ Fax ☒ E-Mail ☐ Verbal

Sample ID	Date / Time	Sample Location / Description	FOR AIR SAMPLES ONLY				Sample Area / Air Volume
			Type	Time On/Off	Avg. LPM	Total Time	
RR-101	6/23/23	INTERIOR WALL / BEIGE PAINT	A P C				
RR-102		EXTERIOR WALL / "	A P C				
RR-103		" / "	A P C				
RR-104		EXTERIOR WINDOW FRAME / BROWN PAINT	A P C				
RR-105		DOOR FRAME / "	A P C				
RR-106		EXTERIOR FASCIA / "	A P C				
RR-107		INTERIOR WALL / CERAMIC TILE	A P C				
			A P C				
			A P C				
			A P C				

Sampled By: MICHAEL MCGUIRE MM Date: 6/23/23 Time: 10:30 AM

Shipped Via: ☒ Fed Ex ☐ DHL ☐ UPS ☐ US Mail ☐ Courier ☐ Drop Off ☐ Other:

Relinquished By: MICHAEL MCGUIRE	Relinquished By:	Relinquished By:
Date / Time: 6/23/23 @ 2:00PM	Date / Time:	Date / Time:
Received By: RECEIVED JUN 26 2023	Received By:	Received By:
Date / Time: FC-5633 1130	Date / Time:	Date / Time:
Condition Acceptable? ☐ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No

San Francisco Office: 3777 Depot Road, Suite 409, Hayward, California 94545-2761 / Ph: (510)887-8828 * (800)827-3274 / Fax: (510)887-4218
Los Angeles Office: 2959 Pacific Commerce Drive, Rancho Dominguez, California 90221 / Ph: (310)763-2374 * (888)813-9417 / Fax: (310)763-4450
Las Vegas Office: 6765 S. Eastern Avenue, Suite 3, Las Vegas, Nevada 89119 / Ph: (702)784-0040 / Fax: (702)784-0030

SGS FORENSIC LABORATORIES

Final Report

Metals Analysis of Paints

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

West Coast Safety Consultants
Michael McGuire

4581 Wavertree
San Luis Obispo, CA 93401

Client ID: 5318
Report Number: M251771
Date Received: 06/26/23
Date Analyzed: 06/28/23
Date Printed: 06/28/23
First Reported: 06/28/23

Job ID / Site: 751 Palm St San Luis Obispo
Date(s) Collected:

SGSFL Job ID: 5318
Total Samples Submitted: 6
Total Samples Analyzed: 6

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
RR-101	30923949	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
RR-102	30923950	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
RR-103	30923951	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
RR-104	30923952	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
RR-105	30923953	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
RR-106	30923954	Pb	0.048	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

Kevin Poon, Laboratory Supervisor, Hayward Laboratory

3777 Depot road, Suite 409, Hayward, CA 94545 | Phone: 510.887.8828 / 800.827.3274 Fax: 510.887.4218 | https://falaboratories.sgs.com

SGS FORENSIC LABORATORIES

Final Report

Metals Analysis of Bulks - TTLC

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

West Coast Safety Consultants
Michael McGuire

4581 Wavertree
San Luis Obispo, CA 93401

Client ID: 5318
Report Number: M251787
Date Received: 06/26/23
Date Analyzed: 06/28/23
Date Printed: 06/28/23
First Reported: 06/28/23

Job ID / Site: 751 Palm St San Luis Obispo
Date(s) Collected:

SGSFL Job ID: 5318
Total Samples Submitted: 1
Total Samples Analyzed: 1

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
RR-107	30923955	Pb	< 6	mg/kg	6	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

Kevin Poon, Laboratory Supervisor, Hayward Laboratory

3777 Depot road, Suite 409, Hayward, CA 94545 | Phone: 510.887.8828 / 800.827.3274 Fax: 510.887.4218 | https://falaboratories.sgs.com

State of California—Health and Human Services Agency

California Department of Public Health

LEAD HAZARD EVALUATION REPORT

Section 1 — Date of Lead Hazard Evaluation 6/23/23

Section 2 — Type of Lead Hazard Evaluation (Check one box only)

☒ Lead Inspection ☐ Risk assessment ☐ Clearance Inspection ☐ Other (specify) _____

Section 3 — Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)]	City	County	Zip Code
751 PALM ST	SAN LUIS OBISPO	SAN LUIS OBISPO	93401

Construction date (year) of structure	Type of structure		Children living in structure?	
UNKNOWN	☐ Multi-unit building	☐ School or daycare	☐ Yes	☒ No
	☐ Single family dwelling	☒ Other RESTROOM	☐ Don't Know	

Section 4 — Owner of Structure (if business/agency, list contact person)

Name	Telephone number
CITY OF SAN LUIS OBISPO - NATHAN GARCIA NAVA	805-783-7865

Address [number, street, apartment (if applicable)]	City	State	Zip Code
919 PALM ST	SAN LUIS OBISPO	CA	93401

Section 5 — Results of Lead Hazard Evaluation (check all that apply)

☒ No lead-based paint detected ☐ Intact lead-based paint detected ☐ Deteriorated lead-based paint detected

☐ No lead hazards detected ☐ Lead-contaminated dust found ☐ Lead-contaminated soil found ☐ Other _____

Section 6 — Individual Conducting Lead Hazard Evaluation

Name	Telephone number
MIKE McGUIRE	805-748-8832

Address [number, street, apartment (if applicable)]	City	State	Zip Code
4581 WAVERTREE ST	SAN LUIS OBISPO	CA	93401

CDPH certification number	Signature	Date
LRC-0000216 6	M.M'G	6/29/23

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

Section 7 — Attachments

A. A foundation diagram or sketch of the structure indicating the specifc locations of each lead hazard or presence of lead-based paint;
B. Each testing method, device, and sampling procedure used;
C. All data collected, including quality control data, laboratory results, including laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed or faxed to:

California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804-6403
Fax: (510) 620-5656

California Department of PublicHealth

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
	Lead Inspector/Assessor	LRC-00002166	10/7/2023
	Lead Project Designer	LRC-00002167	10/7/2023
	Lead Project Monitor	LRC-00002165	10/7/2023

Michael McGuire

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD

APPENDIX I – GEOTECHNICAL ENGINEERING REPORT

GEOTECHNICAL ENGINEERING REPORT
MISSION PLAZA RESTROOM AND CAFE
SAN LUIS OBISPO MISSION PLAZA
SAN LUIS OBISPO, CALIFORNIA

October 21, 2022

Prepared for

Mr. Brian Nelson
City of San Luis Obispo Public Works Department

Prepared by

Earth Systems Pacific
4378 Old Santa Fe Road
San Luis Obispo, CA 93401

Earth Systems
4378 Old Santa Fe Road | San Luis Obispo, CA 93401 | Ph: 805.544.3276 | www.earthsystems.com

October 21, 2022

FILE NO.: 305341-001

Mr. Brian Nelson
City of San Luis Obispo Public Works Department
919 Palm Street
San Luis Obispo CA 93401

PROJECT: MISSION PLAZA – RESTROOM AND CAFE
SAN LUIS OBISPO MISSION PLAZA
SAN LUIS OBISPO, CALIFORNIA

SUBJECT: Geotechnical Engineering Report

Dear Mr. Nelson:

This geotechnical engineering report has been prepared for use in the development of plans and specifications for the proposed restroom and café buildings to be located in the San Luis Obispo Mission Plaza (south of the intersection of Monterey Street and Broad Street) in San Luis Obispo, California.

Preliminary geotechnical engineering recommendations for site preparation, grading, utility trenches, foundations, interior slabs-on-grade and exterior pedestrian flatwork, drainage and maintenance, and observation and testing are presented to guide the development of project plans and specifications. One electronic copy and one bound copy have been provided to you. Additional electronic copies have also been distributed to those mentioned below.

We appreciate the opportunity to have provided services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

Earth Systems Pacific

REGISTERED PROFESSIONAL ENGINEER
ROBERT W. DOWN
No. 70206
CIVIL
STATE OF CALIFORNIA

Robert Down, PE
Principal Engineer

Aileen Flynn, EIT
Staff Engineer

Doc. No.: 2210-071.SER/pm

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION AND SITE SETTING

Based on preliminary project plans provided by RRM design group, the proposed improvement project will consist of the removal of the existing restroom and the construction of a new restroom and café in the San Luis Obispo Mission Plaza. We understand that the café will be approximately 165 square feet and be of wood or steel framed construction. The restroom structure will be approximately 470 square feet and will be of masonry construction. Additional improvements will consist of pedestrian flatwork, underground utilities, and landscaping. There will be no retaining walls, subterranean structures, or infiltration facilities.

We understand the restroom structure will be supported on conventional continuous and spread footings, and the café will be supported on pole foundations. We have estimated dead plus live loads, to be on the order of 2 kips per linear foot and 25 kips for wall and column loads, respectively. Further, the structures will have a relatively short period; and therefore, seismic design criteria using the general ground motion procedure outlined in ASCE 7-16 Sections 11.4.2 through 11.4.5 is provided. Other site improvements will include addition and relocation of underground utilities, exterior pedestrian flatwork, and vehicular pavement.

The site is located in the west portion of the San Luis Obispo Mission Plaza, as shown in Figure 1 – Exploration Location Map in Appendix A. A restroom structure, pedestrian flatwork and several trees currently occupy the project site. The undeveloped portion of the site is covered in grasses. The location of the café structure is relatively flat. The location of the new restroom is relatively flat toward the north then slopes drastically downward toward San Luis Obispo Creek to the south. Grading for the project is expected to include cuts and fills up to 2 feet. The approximate site coordinates from the Google Earth website (Google 2022) are latitude 35.2800 degrees north and longitude 120.66.45 degrees west.

2.0 SCOPE OF SERVICES

The scope of work for this geotechnical engineering investigation included the following: a general site reconnaissance, subsurface exploration, laboratory testing of selected samples, geotechnical evaluation of the data collected, and the preparation of this report.

This report and recommendations are intended to comply with the considerations of Sections 1803.1 through 1803.6, J104.3 and J104.4, as applicable, of the 2019 California Building Code

(CBC) and common geotechnical engineering practice in this area under similar conditions at this time. The test procedures were accomplished in general conformance with the standards noted, as modified by common geotechnical engineering practice in this area under similar conditions at this time.

Preliminary geotechnical engineering recommendations for site preparation, grading, utility trenches, foundations, interior slabs-on-grade and exterior pedestrian flatwork, drainage and maintenance, and observation and testing are presented to guide the development of project plans and specifications. As there may be geotechnical issues yet to be resolved, the geotechnical engineer should be retained to provide consultation as the design progresses, and to review project plans as they near completion to assist in verifying that pertinent geotechnical issues have been addressed and to aid in conformance with the intent of this report.

It is our intent that this report be used exclusively by the client to form the geotechnical basis of the design of the project and in the preparation of plans and specifications. Application beyond this intent is strictly at the user's risk.

This report does not address issues in the domain of contractors such as, but not limited to, site safety, loss of volume due to stripping of the site, shrinkage of soils during compaction, excavatability, dewatering, temporary slope angles, construction means and methods, etc. Analyses of aerial or site geology, or of the soil for corrosivity, radioisotopes, asbestos (either naturally occurring or in man-made products), lead or mold potential, hydrocarbons, or chemical properties is beyond the scope of this report. Any ancillary features such as flag or light poles, temporary access roads, and non-structural fills, or other improvements not addressed herein are not within our scope and are also not addressed.

In the event that there are any changes in the nature, design, or location of improvements, or if any assumptions used in the preparation of this report prove to be incorrect, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions of this report modified or verified by the geotechnical engineer in writing. The criteria presented in this report are considered preliminary until such time as any peer review or review by any jurisdiction has been completed, conditions have been observed by the geotechnical engineer in the field during construction, and the recommendations have been verified as appropriate, or modified by the geotechnical engineer in writing.

3.0 FIELD INVESTIGATION

Our geotechnical field investigation consisted of two exploratory borings drilled at the site on August 17, 2022 to depths ranging from approximately 11.0 to 11.5 feet below the existing ground surface (bgs). Borings were drilled with a truck-mounted Simco EP 200 drill rig that utilized a four-inch outside diameter solid stem auger with an automatic trip hammer for sampling. The approximate locations of the borings are shown on the Figure 2 - Exploration Location Map in Appendix A.

Soil samples were obtained from the exploratory borings using a 3-inch outside diameter ring-lined barrel sampler D 3550 - 17 (with shoe similar to D 2937 - 17) and Standard Penetration Tests (SPT) were conducted at selected depths within the borings (ASTM D1586 -18). Bulk soil samples were also obtained from the auger cuttings. After sampling was complete, the borings were backfilled with the auger cuttings.

Soils encountered in the current borings were categorized and logged in general accordance with the Unified Soil Classification System and ASTM D 2488-17. Copies of the current boring logs and a boring log legend are included in Appendix A. In reviewing the boring logs and legend, the reader should recognize that the legend is intended as a guideline only, and there are a number of conditions that may influence the soil characteristics as observed during drilling. These include, but are not limited to, the presence of cobbles or boulders, cementation, variations in soil moisture, presence of groundwater, and other factors. Consequently, the logger must exercise judgment in interpreting the subsurface characteristics, possibly resulting in soil and bedrock descriptions that vary somewhat from the legend.

4.0 LABORATORY ANALYSIS

Selected samples from the current borings were tested in our laboratory for bulk density (ASTM D 2937-17, modified for ring liners) and moisture content (ASTM D 2216-16), maximum density and optimum moisture content (ASTM D 1557-12), grain size distribution by sieve analysis (ASTM D 1140-17), and cohesion and angle of shearing resistance (ASTM D 3080-11).

The geotechnical laboratory test results for our investigation are presented in Appendix B.

5.0 GENERAL SUBSURFACE PROFILE

Based upon our investigation, the site is underlain by alluvium. The alluvium consisted of layers of medium dense clayey sands and stiff to very stiff sandy lean clays to maximum depths explored of 14.0 to 16.5 feet bgs. Boring 2 was terminated at 14.0 feet due to refusal on cobbles. There was no subsurface water encountered during the exploration.

Please refer to the Boring Logs in Appendix A for a more detailed description of the subsurface conditions encountered in the subsurface investigations performed by this firm at the site.

6.0 CONCLUSIONS

In our opinion, the site is suitable, from a geotechnical engineering standpoint, for the restroom and café buildings discussed in the "Introduction and Site Setting" section of the report, provided the recommendations contained herein are implemented in the design and construction. In our opinion, the primary geotechnical engineering concerns at the site are the potential for strong seismic shaking and soil expansion potential. Total and differential settlement, soil erosion potential and liquefaction potential are also discussed below.

Strong Seismic Shaking

The site is in a region of high seismic activity with the potential for large seismic events that could generate strong ground shaking. The CBC requires that seismic loads be considered in structural design. A seismic analysis was undertaken to provide seismic acceleration design parameters; the results are presented in the "Foundations" section of this report for use by others in the structural design process.

The 2010 ASCE 7 method with 2013 updates available on the Structural Engineers Associate of California (SEAOC) Seismic Design Map Tool website (SEAOC, 2021) was used for the seismic analysis. The risk category for buildings and structures is assigned by others in accordance with CBC Table 1604.5; however, based on our current understanding of the project, we selected Risk Category II for our analysis. Based upon the subsurface conditions encountered during our subsurface investigation, Site Class "D", "Stiff Soil," was used. A general ground motion seismic analysis was performed, assuming that Exception 2 listed in Section 11.4.8 (ASCE, 2017) will apply to the project. We also provided seismic parameters if the Simplified Lateral Force Analysis Procedure from Section 12.14.8 (ASCE, 2017) will be used in structural design.

Soil Expansion Potential

An expansion index test of the near-surface soils yielded a result of 33. Per Section 1803.5.3 of the 2019 CBC, soils are considered to be non-expansive for expansion index values of 20 or less and expansive for values higher than 20. Using the terminology typically associated with the ASTM test method for expansion, the soils are considered to have "low" expansion potential. Expansive soils tend to swell with increases in soil moisture and shrink as soil moisture decreases; the upper 3 to 5 feet of soil is the zone most affected by these seasonal soil moisture fluctuations. The volume changes that these materials undergo in this cyclical pattern can damage slabs and foundations if precautionary measures are not incorporated into the design and construction procedures. Recommendations for reducing the potential for damage to the proposed improvements, including moisture conditioning the soil, placement of non-expansive fill, and deepening foundations, are provided in the "Preliminary Geotechnical Recommendations" Section of this report.

Potential for Total and Differential Settlement

Settlement (total and differential) can occur when foundations and surface improvements span materials having variable consolidation, moisture, and density characteristics. Such a situation can stress and possibly damage foundations and surface improvements, often resulting in severe cracks and displacement. To reduce this settlement potential, it is necessary for all foundations and surface improvements to bear on material that is as uniform as practicable. A program of overexcavation, moisture conditioning, and compaction of the upper soils in the building and surface improvement areas is recommended to provide more uniform soil moisture and density and appropriate support.

Erosion Potential

The site soils are considered to be erodible. Caution should be exercised to protect the soil from erosion during and following construction.

Liquefaction Settlement

The site is mapped by the City of San Luis Obispo (2014) as being in an area of moderate liquefaction potential. However, due to the lack of subsurface water encountered in our borings and the clay content in the soils encountered, it is our opinion the potential for damage due to liquefaction at the site is very low.

7.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

These recommendations are applicable for the proposed project as described in the "Introduction and Site Setting" section of this report. If other improvements not previously mentioned are included, the geotechnical engineer should be contacted for revised recommendations.

Unless otherwise noted, the following definitions are used in the recommendations presented below. Where terms are not defined, definitions commonly used in the construction industry are intended.

- **Building Slab Area:** The building slab area is defined as the area within and not including the perimeter of the proposed foundations.
- **Flatwork Areas:** The area within the limits of exterior pedestrian flatwork and extending a minimum of 1 foot beyond the perimeter of the proposed improvements.
- **Grading Area –** The entire area to be graded, including building slab, foundation, and flatwork areas.
- **Subgrade:** The elevation of the surface upon which a sand cushion/non-expansive imported material or aggregate base will be placed for flatwork improvements.
- **Existing Grade:** Elevations of the site that existed as of the date of this report.
- **Finish Pad Grade:** The elevation in the building area where earthwork operations are typically considered to be complete. It does not include any sand or gravel that might be placed below slabs in association with vapor protection for the slabs.
- **Scarified:** Thoroughly plowed or ripped in two orthogonal directions to a depth of not less than 8 inches.
- **Moisture Conditioned:** Soil moisture content adjusted to just above optimum moisture content prior to application of compactive effort.
- **Compacted / Recompacted:** Soils placed in level lifts not exceeding 8 inches in loose thickness and compacted to a minimum of 90 percent of maximum dry density, unless specified otherwise. The standard tests used to establish maximum dry density and field density should be ASTM D 1557-12 and ASTM D 6938-17, respectively, or other methods acceptable to the geotechnical engineer and jurisdiction.

Site Preparation

1. The ground surface in the grading area should be prepared for construction by removing existing improvements, vegetation, debris, and other deleterious materials. Any existing utility lines that will not remain in service should be either removed or abandoned. The appropriate method of utility abandonment will depend upon the type and depth of the utility. Recommendations for abandonment during construction can be made by the geotechnical engineer, as necessary.

2. Voids created by the removal of materials or utilities described above and extending below the recommended depth of overexcavation should be called to the attention of the geotechnical engineer. No fill should be placed unless the underlying soil has been observed by the geotechnical engineer.

Grading

1. Following site preparation, soils within the building slab area should be removed to a level plane at a minimum depth of 1 foot below planned bottom-of-slab elevation. The exposed surfaces should then be scarified, moisture conditioned and recompacted.

2. Exterior pedestrian flatwork areas should be excavated to 1 foot below planned subgrade elevation or existing grade, whichever is deeper. The soi surface exposed by overexcavation should be scarified, moisture conditioned and recompacted.

3. Voids created by dislodging cobbles and/or debris during scarification should be backfilled and recompacted, and the dislodged materials should be removed from the work area.

4. Within the building slab area, all soils used as fill should be nonexpansive.

5. Nonexpansive soils are defined as falling into the GP, GW, GM, GC, SM, SC, SP, or SW categories (ASTM D 2487-17) and having an expansion index of 10 or less (ASTM D 4829-21). Imported nonexpansive soils used in the building area should have strength qualities equal to or better than the site soils. All proposed imported fill should be approved by the geotechnical engineer before being transported to the site and periodically during construction. The clean sand layer described in the “Interior Slabs-on-Grade and Exterior Pedestrian Flatwork” Section of this report (if utilized) is considered to be part of the minimum recommended depth of nonexpansive material, not in addition to it.

6. Previously removed site soils may be used as fill beyond the building slab area.

7. All materials used as fill should be cleaned of all debris and any rocks larger than 6 inches in maximum dimension. When fill material includes rocks, the rocks should be placed in a sufficient soil matrix to ensure that voids caused by nesting of the rocks will not occur and that the fill can be properly compacted.

8. If the soils become unstable, or if the recommended compaction cannot be readily achieved, drying the soil to just above optimum moisture content may be necessary. Placement of gravel layers or geotextiles may also be necessary to help stabilize unstable soils. Soils that are disturbed in any manner should be removed, moisture conditioned, and recompacted.

Utility Trenches

1. Unless otherwise recommended, utility trenches adjacent to foundations should not be excavated within the zone of foundation influence, as shown in Typical Detail A in Appendix D.

2. Utilities that must pass beneath a foundation should be placed with properly compacted utility trench backfill and the foundation should be designed to span the trench.

3. A select, noncorrosive, easily compacted sand should be used as bedding and shading immediately around utilities. All trench backfill, within the upper 12 inches of the building areas should be nonexpansive. Site soils or select import may be used as trench backfill within the remaining trench depths.

4. Utility trench backfill should be moisture conditioned and compacted to a minimum of 90 percent of maximum dry density. Trenches located within areas subject to vehicle loading should be compacted to a minimum of 95 percent of maximum dry density within the upper foot of subgrade and all aggregate base.

5. Trench backfill should be placed in level lifts not exceeding 6 inches in loose thickness, moisture conditioned, and compacted to the minimums noted above.

6. Compaction of trench backfill by jetting or flooding is not recommended except under extraordinary circumstances. However, to aid in *encasing* utility conduits, particularly corrugated drain pipes, and multiple, closely spaced conduits in a single trench, jetting or flooding may be useful. Flooding or jetting should only be attempted with extreme caution, and any jetting operation should be subject to review by the geotechnical engineer.

7. The recommendations of this section are minimums only, and may be superseded by the requirements of the architect/engineer, the recommendations of the pipe manufacturers or utility companies, or the requirements of the governing jurisdiction based upon soil corrosivity or other factors.

Foundations

Shallow Foundations

1. Conventional continuous and spread footings bearing in firm, native soils should be utilized to support the restroom structure. The footings should be constructed at a minimum overall depth of 30 inches below finished grade. The full perimeter of the structure should be supported by footings or grade beams. Footing reinforcement should be in accordance with the requirements of the architect/engineer.

2. Footings bearing into firm, native soils may be designed using maximum allowable bearing capacities of 1,500 psf dead load and 2,000 psf dead plus live load. Using these values, settlement is expected to be less than 3/4 inch.

3. Continuous footings and grade beams should be reinforced, at a minimum, by two No. 5 rebar, one at the top and one at the bottom, or as required by the architect/engineer. Spread footings should be reinforced in accordance with the requirements of the architect/engineer.

Pole Foundations

1. Pole foundations may be utilized for the café structure. The pole foundations should have a minimum diameter of 24 inches and extend a minimum depth of 7 feet into native soils.

2. The pole foundations should not be constructed closer than two diameters (clear span) to each other without approval from this firm.

3. When the foundation acts in compression, an allowable shaft resistance value 300 psf for native soils. No end bearing capacity should be used in the calculations. For resistance to lateral loads, pole foundations may be designed using an ultimate passive equivalent fluid pressure of 250 pcf. Passive and friction components may be combined in the analysis without reduction to either value.

4. The pole foundations should be connected on at least two sides with grade beams a minimum of 18 inches deep. The foundations should be designed to act as an integral unit.

5. The soils may not stand vertically during the caisson construction. Casing, drill fluid, or other means of keeping the hole open may be necessary.

6. As the pole foundations will utilize side resistance for support, it is not necessary to remove all loose debris and slough material from the bottoms of the excavations, although the majority of loose debris and slough material should be removed by means of a clean-out bucket or other suitable means. As stated earlier, use of end-bearing capacity is not recommended.

7. Concrete used in pole foundations should be placed at a slump between 4 and 6 inches in dry excavations.

8. The pole foundations should not deviate from a plumb line taken from the center of the foundation by more than 2 percent of the foundation length, from the top to the point of interest.

9. All pole foundations should be concreted the same day as they are drilled. If this is not practicable, the pole foundations should be secured in a safe manner in conformance with CalOSHA or other applicable safety standards until they are concreted. Any pole foundation excavation that has not been concreted the same day as it was drilled should have the soil and rock surfaces “freshened” by extending the rotating auger into and out of the hole several times, and the additional slough and debris removed, immediately prior to placement of the rebar and concrete.

10. Special inspection of the drilling of the pole foundations as well as placement of the reinforcing and concrete should be provided.

Foundations – General

1. Allowable bearing capacities may be increased by one-third when transient loads such as wind or seismicity are included.

2. The seismic acceleration site parameters included in the table below have been provided to the design team for use in its analyses. The 2010 ASCE 7 method with 2013 updates, available on the Structural Engineers Association of California website (SEAOC 2021), was used to obtain the parameters. The project was considered to be a "nonessential" facility from the perspective of risk category as described by the CBC. The site coordinates stated in the "Introduction and Site Setting" section were used in the analysis. Based upon the subsurface conditions encountered during our investigation, the site should be classified as Site Class D (Stiff Soil). Foundations may be designed using the following 2019 CBC seismic parameters.

SEISMIC ACCELERATION SITE PARAMETERS

Mapped Spectral Response Accelerations		**Site Coefficients for Site Class D**		**Adjusted MCE Spectral Response Accelerations for Site Class D**		**Design Spectral Response Accelerations for Site Class D**	
Seismic Parameter	Value (g)	Site Coefficient	Value	Seismic Parameter	Value (g)	Seismic Parameter	Value (g)
S_S	1.059	F_a	1.080	S_{MS}	1.140	S_{DS}	0.760
S_1	0.391	F_v	1.910	S_{M1}	0.746	S_{D1}	0.498
Peak Mean Ground Acceleration (PGA_m): 0.531 g							
Seismic Design Category: D							

3. For resistance to lateral loads, shallow foundations may be designed using an ultimate passive equivalent fluid pressure of 350 pcf and a friction factor of 0.35. Passive and friction components may be combined in the analysis without reduction to either value. Lateral capacity is based on the assumption that any backfill adjacent to foundations has been properly compacted.

4. Foundation excavations should be observed by the geotechnical engineer during excavation and prior to placement of formwork, reinforcing steel or concrete. Soil in foundation excavations should be moistened to optimum moisture content, or just above, prior to application of compactive effort, and no desiccation cracks should be present prior to concrete placement.

Interior Slabs-on-Grade and Exterior Pedestrian Flatwork

Interior Slabs-On-Grade

1. Interior pedestrian slabs-on-grade should have a minimum thickness of 4 inches. They should be reinforced and doweled to foundations per the specifications of the architect/engineer. At a minimum, interior slabs should be reinforced with No. 3 rebar at 24 inches on center each way. All structural slabs should contain minimum rebar meeting the criteria of ACI 318 (ACI 2014). At a minimum, foundation dowels should be lap spliced to the slab rebar. The size and spacing of the dowels should match the size and spacing of the slab rebar.

Exterior Pedestrian Flatwork

1. Exterior pedestrian flatwork should have a minimum thickness of 4 inches. Minimum reinforcement for exterior pedestrian flatwork should consist of No. 3 rebar placed at 24 inches on-center each way.

2. Exterior pedestrian flatwork should have thickened edges a minimum of 6 inches below the bottom of the slab.

3. Flatwork should be constructed with frequent joints to allow articulation as the flatwork moves in response to seasonal soil temperature and moisture variations. The soil below flatwork should be moisture conditioned prior to casting the flatwork.

4. Flatwork at doorways, and at other areas where maintaining the elevation of the flatwork is desired, should be doweled to the perimeter foundations or other adjacent improvements. The dowel spacing and diameter should match that of the reinforcement. In other areas, the flatwork may be doweled to the foundation, or the flatwork may be allowed to “float free,” at the discretion of the architect/engineer. Flatwork that is intended to float free should be separated from foundations by a felt joint or other means.

Moisture Vapor Transmission

1. Due to the current use of impermeable floor coverings, water-soluble flooring adhesives, and the speed at which buildings are now constructed, moisture vapor transmission through slabs is more common than in past years. *Where moisture vapor transmitted from the underlying soil would be undesirable*, the slabs should be protected from subsurface moisture vapor. A number of options for vapor protection are discussed below; however, the means of vapor protection, including the type and thickness of the vapor retarder, if specified, are left to the discretion of the architect/engineer.

2. *Where specified*, vapor retarders should conform to ASTM Standard E1745-17. This standard specifies properties for three performance classes, Class "A", "B" and "C". The appropriate class should be selected based on the potential for damage to the vapor retarder during its installation and placement of slab reinforcement and concrete.

3. It should be noted that ASTM E 1745-17 has the same permeance threshold for Class A through Class C (0.1 perms). The class chosen will make a difference in how resistant the vapor retarder is to punctures and tears, but it will not insure any better permeance values to protect floor coverings.

4. Several recent studies, including those of ACI Committee 302 (ACI 2015), have concluded that excess water above the vapor retarder increases the potential for moisture damage to floor coverings and could increase the potential for mold growth or other microbial contamination. The studies also concluded that it is preferable to eliminate the typical sand layer beneath the slab and place the slab PCC in direct contact with a vapor retarder, particularly during wet weather construction. However, placing the PCC directly on the vapor retarder requires special attention to specifying the proper vapor retarder, a very low water-cement ratio in the PCC mix, and special finishing and curing techniques.

5. Another option for vapor protection would be the use of vapor-inhibiting admixtures in the slab PCC mix and/or application of a sealer to the surface of the slab. This would also require special PCC mixes and placement procedures, depending upon the recommendations of the admixture or sealer manufacturer.

6. A third option that may be a reasonable compromise between effectiveness and cost considerations would be the use of a subslab vapor retarder protected by a layer of granular material or of clean sand, with the granular material being the preferred choice. The granular material should be easily compactible and have a relatively low fines content and a low wicking potential. Clean sand is defined as a well or poorly graded sand (ASTM D2487-17) of which less than 3 percent passes the No. 200 sieve. The retarder should be covered with a minimum 4 inches of granular material or clean sand. If a Class "A" vapor retarder is specified, the retarder can be placed directly on the compacted soil material. If a less durable vapor retarder is specified (Class "B" or "C"), a minimum of 1-inch of clean sand should be placed over the compacted soil material to reduce the chance of puncturing the vapor retarder.

7. If sand is used between the vapor retarder and the slab, it should be moistened only as necessary to promote concrete curing; *saturation of the sand should be avoided*, as the excess moisture would be on top of the vapor retarder, potentially resulting in vapor transmission through the slab for months or years.

8. Regardless of the underslab vapor retarder selected, proper installation of the retarder is critical for optimum performance. Where utilized, the vapor retarded should be placed a minimum of 1-inch above the flow line of the drainage path surrounding the structures, or 1-inch above the area drain grates if area drains are used to collect runoff around the structures. All seams must be properly lapped, and all seams and utility penetrations properly sealed in accordance with the vapor retarder manufacturer's recommendations and ASTM E1643-18a. At the terminating edges of the vapor retarder, the vapor retarder should be effectively sealed with accessories specifically designed to seal the material to new or existing concrete; details for edge sealing of the vapor retarder should be provided by the architect/engineer.

Slabs-on-Grade - General

1. To reduce shrinkage cracks in all interior and exterior slabs-on-grade, the concrete aggregates should be of appropriate size and proportion, the water/cement ratio should be low, the concrete should be properly placed and finished, contraction joints should be installed, and the concrete should be properly cured. This is particularly applicable to slabs that will be cast directly upon a vapor retarder and those that will be protected from transmission of vapor by use of admixtures or surface sealers. Concrete materials, placement, and curing specifications should be at the direction of the architect/engineer; AC 302.1R-15 (ACI 2015) is suggested as a resource for the architect/engineer in preparing such specification.

Drainage and Maintenance

1. Unpaved ground surfaces should be graded during construction, and per Section 1804.4 of the 2019 CBC, finish graded to direct surface runoff away from foundations, slopes, and other improvements at a minimum 5 percent grade for a minimum distance of 10 feet. If this is not feasible due to the terrain, property lines, or other factors, swales with improved surfaces, area drains, or other drainage features should be provided to divert drainage away from these areas.

2. Finished surfaces should be sloped to freely drain toward appropriate drainage facilities. Water should not be allowed to stand or pond on or adjacent to slopes or other improvements.

3. Where infiltration stormwater control measure areas will lie within 8 feet of foundations, flatwork, pavement, or other similar surface improvement, moisture protection should be provided between the infiltration feature and the improvement. Moisture protection should consist of curbs or impermeable liners, deepened to a minimum of 2 feet below foundations, or the bottom of the infiltration facility, whichever is deeper. It is not anticipated that this protection needs to extend greater than 8 feet.

4. The eaves of the proposed building should be provided with roof gutters. Runoff from roof gutters, downspouts, area drains, weep holes, etc., should discharge to an appropriate outlet in a nonerosive manner away from foundations and other

improvements in accordance with the requirements of the governing agencies. Erosion protection should be placed at all discharge points unless the discharge is to a pavement surface.

5. Stabilization of surface soils, particularly those disturbed during construction, by vegetation or other means *during and following construction,* should be implemented to protect the site from erosion damage. Care should be taken to establish and maintain vegetation.

6. To reduce the potential for damage due to erosion it is essential that the surface soils, particularly those disturbed during construction, be stabilized by vegetation or other means during and following construction. Care should be taken to establish and maintain vegetation. The landscaping and exterior flatwork should be installed to maintain the surface drainage recommended above.

7. To reduce the potential for disruption of drainage patterns and undermining of foundations and other improvements, rodent activity should be aggressively controlled.

Observation and Testing

1. It must be recognized that the recommendations contained in this report are based on a limited number of borings and rely on continuity of the subsurface conditions encountered. Therefore, the geotechnical engineer should be retained to provide consultation during the design phase, to review plans as they near completion, to interpret this report during construction, and to provide construction monitoring in the form of testing and observation.

2. At a minimum, the geotechnical engineer should be retained to provide:

    - Review of the project plans as they near completion
    - Professional observation during grading and backfill
    - Oversight of soil special inspection during grading and foundation construction

3. Special inspection of grading and backfill should be provided as per Section 1705.6 and Table 1705.6 of the 2019 CBC. The special inspector should be under the direction of the geotechnical engineer. It is our opinion that none of the grading construction is of a nature that should warrant continuous special inspection; periodic special inspection should

suffice. Subject to approval by the Building Official, the exception to continuous special inspection is described in Section 1704.2 of the 2019 CBC and should be specified by the architect/engineer and periodic special inspection of the following items should be provided by the special inspector.

- Stripping and clearing of all existing improvements, vegetation and unsuitable materials
- Overexcavation to the recommended depths
- Scarification, moisture conditioning, and compaction of the soil
- Fill quality, placement, moisture conditioning and compaction
- Utility trench backfill
- Foundation excavations
- Subgrade and AB/nonexpansive fill compaction and proof-rolling

4. A program of quality control should be developed prior to beginning grading. The contractor or project manager should determine any additional inspection items required by the architect/engineer or the governing jurisdiction.

5. Locations and frequency of compaction tests should be per the recommendation of the geotechnical engineer at the time of construction. The recommended test location and frequency may be subject to modification by the geotechnical engineer, based upon soil ad moisture conditions encountered, size and type of equipment used by the contractor, the general trend of the results of compaction tests, or other factors.

6. A preconstruction conference among the owner, the geotechnical engineer, the governing agency, the special inspector, the project inspector, the architect/engineer, and contractors is recommended to discuss planned construction procedures and quality control requirements.

7. The geotechnical engineer should be notified at least 48 hours prior to beginning construction operations. If Earth Systems Pacific is not retained to provide construction observation and testing services, it shall not be responsible for the interpretation of the information by others or any consequences arising therefrom.

8.0 CLOSURE

Our intent was to perform the investigation in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project and under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the "Scope of Services" Section. Application beyond the stated intent is strictly at the user's risk.

This report is valid for conditions as they exist at this time for the type of project described herein. The conclusions and recommendations contained in this report could be rendered invalid, either in whole or in part, due to changes in building codes, regulations, standards of geotechnical or construction practice, changes in physical conditions, or the broadening of knowledge. If Earth Systems Pacific is not retained to provide construction observation and testing services, it shall not be responsible for the interpretation of the information by others or any consequences arising therefrom.

If changes with respect to project type or location become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions used in the preparation of this report are not correct, this firm shall be notified for modifications to this report. Any items not specifically addressed in this report should comply with the CBC and the requirements of the governing jurisdiction.

The preliminary recommendations of this geotechnical report are based upon the geotechnical conditions encountered at the site and may be augmented by additional requirements of the architect/engineer, or by additional recommendations provided by the geotechnical engineer based on conditions exposed at the time of construction.

Thank you for this opportunity to have been of service. If you have any questions, please feel free to contact this office at your convenience.

End of Text.

TECHNICAL REFERENCE LIST

ACI (American Concrete Institute). 2014. "Building Code Requirements for Structural Concrete." *Document 318-14*.

ACI (American Concrete Institute). 2015. "Guide for Concrete Floor and Slab Construction." Documents 302.1R.15.

ASCE (American Society of Civil Engineers). 2013. *Minimum Design Loads for Buildings and other Structures (7-10, third printing), Standards ASCE/SEI 7-10*.

California Building Code. 2019. *California Code of Regulations, Title 24, Part 2.*

Google Earth. 2022. Google Earth [website], retrieved from: http://www.google.com/earth/index.html

USGU (United States Geological Survey). 2021. Earthquake Hazards Program, retrieved from: http://earthquake.usgs.gov/hazards/designmaps/

SEAOC (Structural Engineers Association of California). 2021. “Seismic Design Map Tool.” Retrieved from: https://seismicmaps.org/

APPENDIX A

Figure 1 – Site Vicinity Map

Figure 2 – Exploration Location Map

Boring Log Legend

Boring Logs

NOT TO SCALE

BASE MAP PROVIDED BY: Google Earth (2022)

Earth Systems Pacific
4378 Old Santa Fe Road, San Luis Obispo, CA 93401
www.earthsystems.com
(805) 544-3276 ● Fax (805) 544-1786

SITE VICINITY MAP

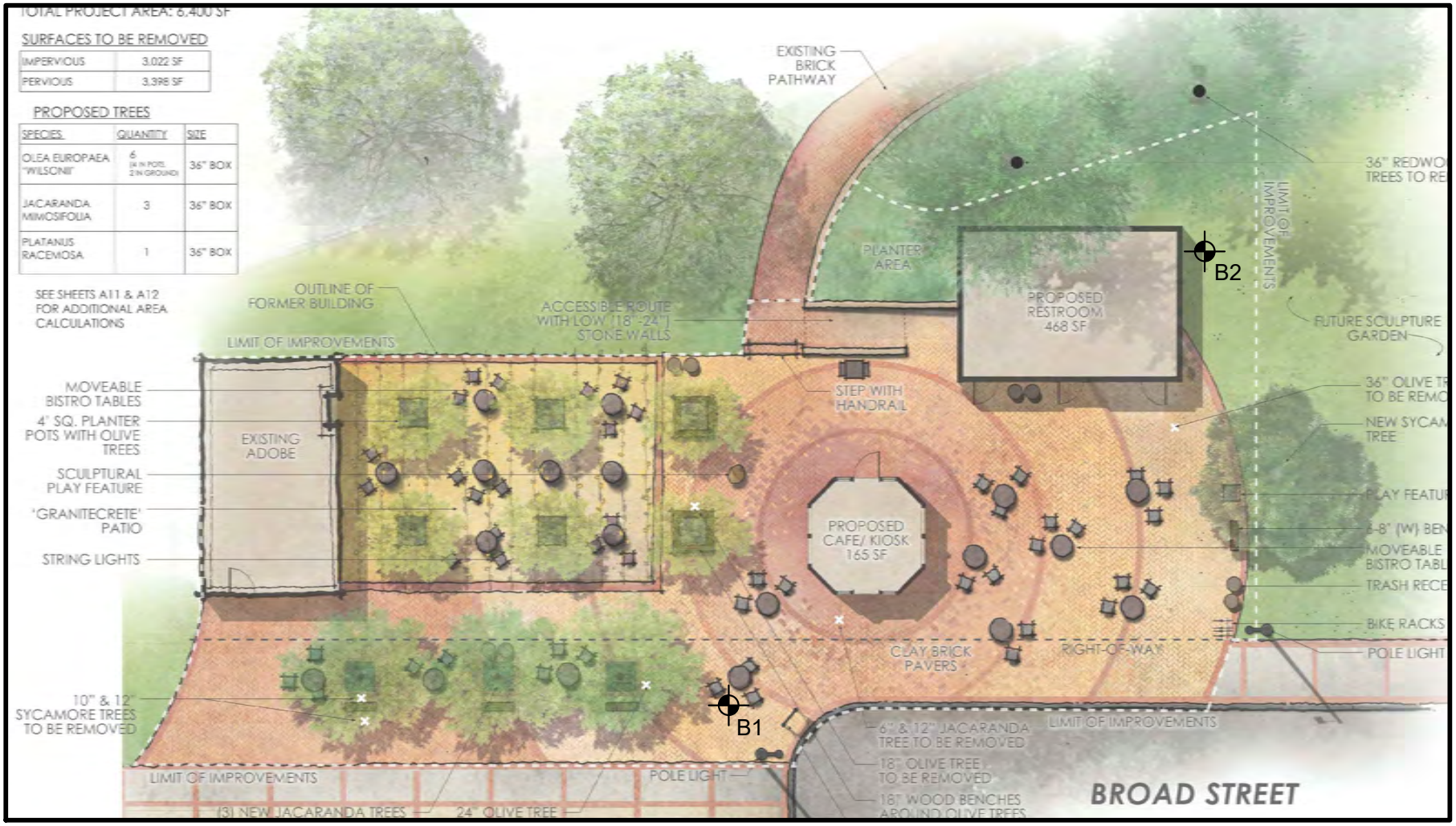
Mission Plaza - Restroom and Cafe
San Luis Obispo Mission Plaza
San Luis Obispo, California

Date
October 2022

Project No.
305341-001

Figure 1

305341--001MISSIONPLAZA--RESTROOMANDCAFE082222maps.dwg



LEGEND

B1 Boring Location (Approx.)

NOT TO SCALE

BASE MAP PROVIDED BY: RRM Design Group

Earth Systems Pacific
4378 Old Santa Fe Road, San Luis Obispo, CA 93401
www.earthsystems.com
(805) 544-3276 • Fax (805) 544-1786

EXPLORATION LOCATION MAP

Mission Plaza - Restroom and Cafe
San Luis Obispo Mission Plaza
San Luis Obispo, California

Date
October 2022

Project No.
305341-001

Figure 2

305341--001MISSIONPLAZA--RESTROOMANDCAFE082222maps.dwg

Earth Systems Pacific

BORING LOG LEGEND

SAMPLE / SUBSURFACE WATER SYMBOLS	GRAPH. SYMBOL
CALIFORNIA MODIFIED	
STANDARD PENETRATION TEST (SPT)	
SHELBY TUBE	
BULK	
SUBSURFACE WATER DURING DRILLING	
SUBSURFACE WATER AFTER DRILLING	

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

MAJOR DIVISIONS	GROUP SYMBOL	TYPICAL DESCRIPTIONS	GRAPH. SYMBOL
COARSE GRAINED SOILS (MORE THAN HALF OF MATERIAL IS LARGER THAN #200 SIEVE SIZE)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
	GP	POORLY GRADED GRAVELS, OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES	
	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES	
	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
	SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	
	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES	
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES	
FINE GRAINED SOILS (HALF OR MORE OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE)	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

OBSERVED MOISTURE CONDITION

DRY	SLIGHTLY MOIST	MOIST	VERY MOIST	WET (SATURATED)

CONSISTENCY

COARSE GRAINED SOILS			FINE GRAINED SOILS		
BLOWS/FOOT		DESCRIPTIVE TERM	BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER		SPT	CA SAMPLER	
0-10	0-16	LOOSE	0-2	0-3	VERY SOFT
11-30	17-50	MEDIUM DENSE	3-4	4-7	SOFT
31-50	51-83	DENSE	5-8	8-13	MEDIUM STIFF
OVER 50	OVER 83	VERY DENSE	9-15	14-25	STIFF
			16-30	26-50	VERY STIFF
			OVER 30	OVER 50	HARD

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENING		
# 200	# 40	# 10	# 4	3/4"	3"	12"

SILT & CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

TYPICAL BEDROCK HARDNESS

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
EXTREMELY HARD	CORE, FRAGMENT, OR EXPOSURE CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS
VERY HARD	CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CORE OR FRAGMENT BREAKS WITH REPEATED HEAVY HAMMER BLOWS
HARD	CAN BE SCRATCHED WITH KNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE); HEAVY HAMMER BLOW REQUIRED TO BREAK SPECIMEN
MODERATELY HARD	CAN BE GROOVED 1/16 INCH DEEP BY KNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE; CORE OR FRAGMENT BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE
SOFT	CAN BE GROOVED OR GOUGED EASILY BY KNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL; BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE
VERY SOFT	CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH KNIFE; BREAKS WITH LIGHT MANUAL PRESSURE

TYPICAL BEDROCK WEATHERING

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
UNWEATHERED	NO DISCOLORATION, NOT OXIDIZED
SLIGHTLY WEATHERED	DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM, FRACTURES: SOME FELDSPAR CRYSTALS ARE DULL
MODERATELY WEATHERED	DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES, USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY", FELDSPAR CRYSTALS ARE "CLOUDY"
HIGHLY WEATHERED	DISCOLORATION OR OXIDATION THROUGHOUT; FELDSPAR AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT, OR CHEMICAL ALTERATION PRODUCES IN SITU DISAGGREGATION
DECOMPOSED	DISCOLORATION OR OXIDATION THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; FELDSPAR AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY

drafting/masters/Boring Log Legend 062719.dwg

Earth Systems Pacific

Boring No. 1

LOGGED BY: A. Flynn
DRILL RIG: SIMCO EP200 with Automatic Hammer
AUGER TYPE: 4" Solid Stem

PAGE 1 OF 1
JOB NO.: 305341-001
DATE: 08/17/2022

Mission Plaza - Restroom and Cafe
San Luis Obispo Mission Plaza
San Luis Obispo, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	SM		SILTY SAND: dark brown, medium dense, slightly moist (Topsoil)					
1	SC			0.5 - 4.0	○			
2			CLAYEY SAND: brown, medium dense, slightly moist (Alluvium)					
3			pale brown					
4	CL		SANDY LEAN CLAY: dark yellowish brown, very stiff, slightly moist					8
5				5.0 - 6.5	■	99.7	16.3	16
6			moist					19
7								
8								
9								9
10				10.0 - 11.5	■			11
11	SC		CLAYEY SAND: dark brown with yellow and red mottling, medium dense, moist, trace gravel					16
12								
13	CL		SANDY LEAN CLAY: brown, very stiff, moist					
14								11
15			CLAYEY SAND: dark brown with yellow and red mottling, medium dense, moist	15.0 - 16.5	■			18
16	SC							28
17			End of Boring @ 16.5'					
18			No subsurface water encountered					
19								
20								
21								
22								
23								
24								
25								
26								

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 2

LOGGED BY: A. Flynn
DRILL RIG: SIMCO EP200 with Automatic Hammer
AUGER TYPE: 4" Solid Stem

PAGE 1 OF 1
JOB NO.: 305341-001
DATE: 08/17/2022

Mission Plaza - Restroom and Cafe
San Luis Obispo Mission Plaza
San Luis Obispo, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CL		SANDY LEAN CLAY: brown, stiff, moist (Alluvium)	0.0 - 5.0	◯			
3			pale brown, very stiff					
5				5.0 - 6.5	■	104.8	15.9	10 17 26
6			dark yellowish brown					
9	SC		CLAYEY SAND: yellowish brown, medium dense, slightly moist					
10				10.0 - 11.5	■			10 16 26
12	CL		SANDY LEAN CLAY: brown, very stiff, moist	12.5 - 14.0	■			10 26 30
13			cobbles					
14			End of Boring @ 14.0' due to refusal No subsurface water encountered					

LEGEND: ■ Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

APPENDIX B

Geotechnical Laboratory Test Results

City of SLO Mission Plaza
Restaurant and Café

305341-001

BULK DENSITY TEST RESULTS

ASTM D 2937-17 (modified for ring liners)

September 8, 2022

BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
1	6.0 - 6.5	16.3	115.9	99.7
2	6.0 - 6.5	15.9	121.5	104.8

EXPANSION INDEX TEST RESULTS

ASTM D 4829-19

BORING NO.	DEPTH feet	EXPANSION INDEX
2	0.0 - 5.0	33

City of SLO Mission Plaza
Restaurant and Café

305341-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

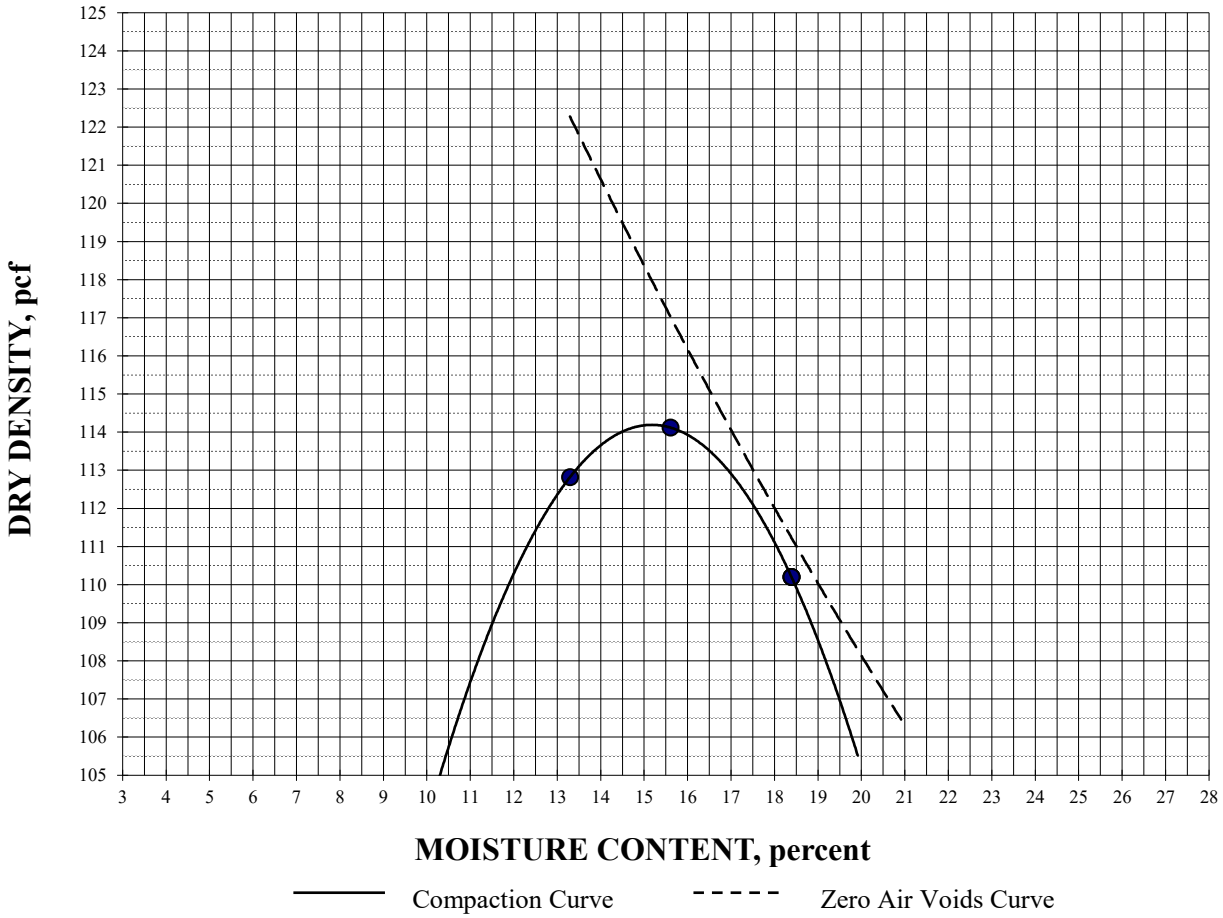
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.65 (assumed)

September 8, 2022
Boring #2 @ 0.0 - 5.0'
Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 114.2 pcf
OPTIMUM MOISTURE: 15.2%



City of SLO Mission Plaza
Restaurant and Café

305341-001

DIRECT SHEAR

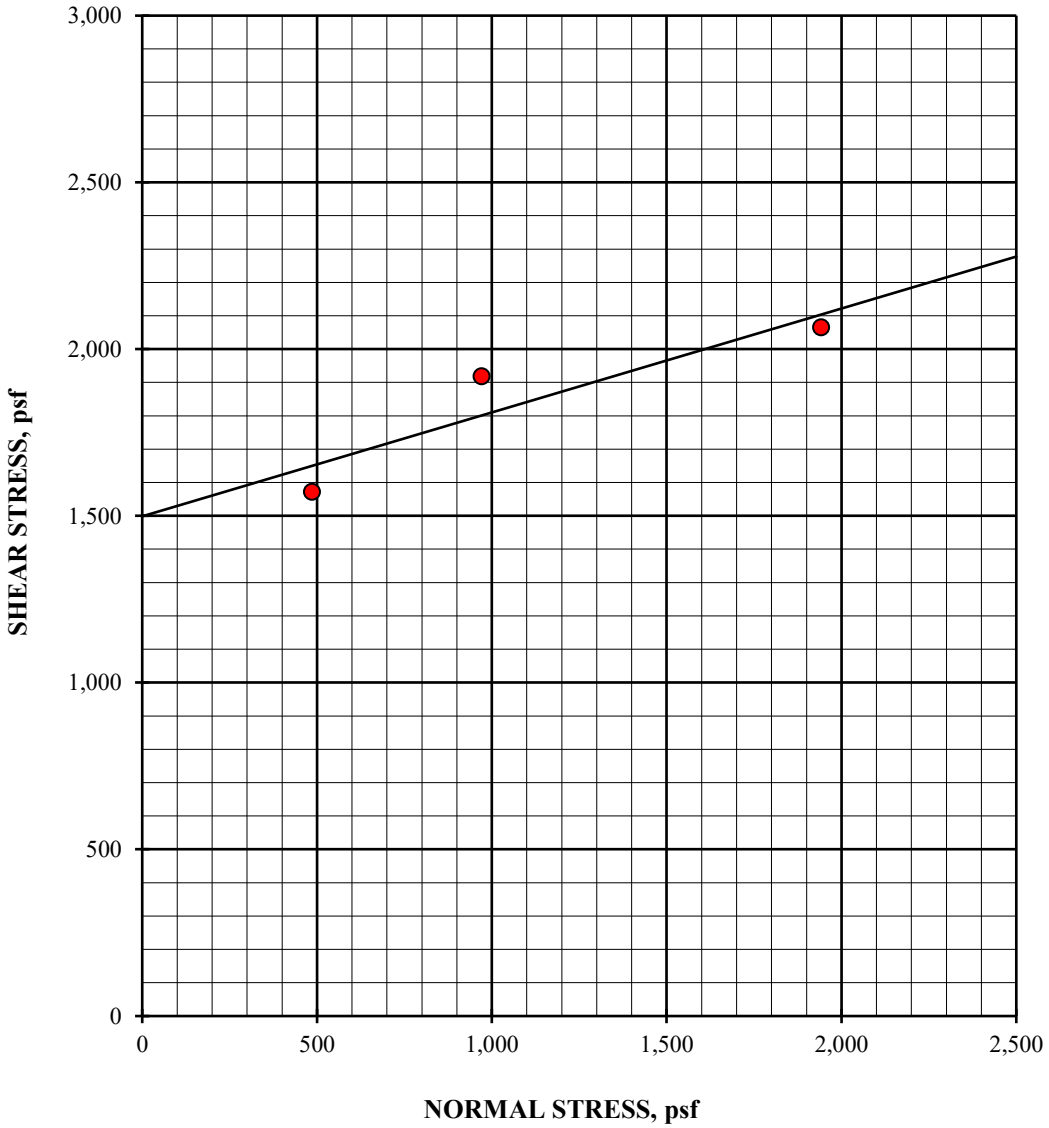
ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)

September 8, 2022

Boring #2 @ 0.0 - 5.0'
Sandy Lean Clay (CL)
Compacted to 90% RC, saturated

INITIAL DRY DENSITY: 102.8 pcf
INITIAL MOISTURE CONTENT: 15.2 %
PEAK SHEAR ANGLE (Ø): 17°
COHESION (C): 1,499 psf

SHEAR vs. NORMAL STRESS



City of SLO Mission Plaza
Restaurant and Café

305341-001

DIRECT SHEAR continued

ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)

Boring #2 @ 0.0 - 5.0'

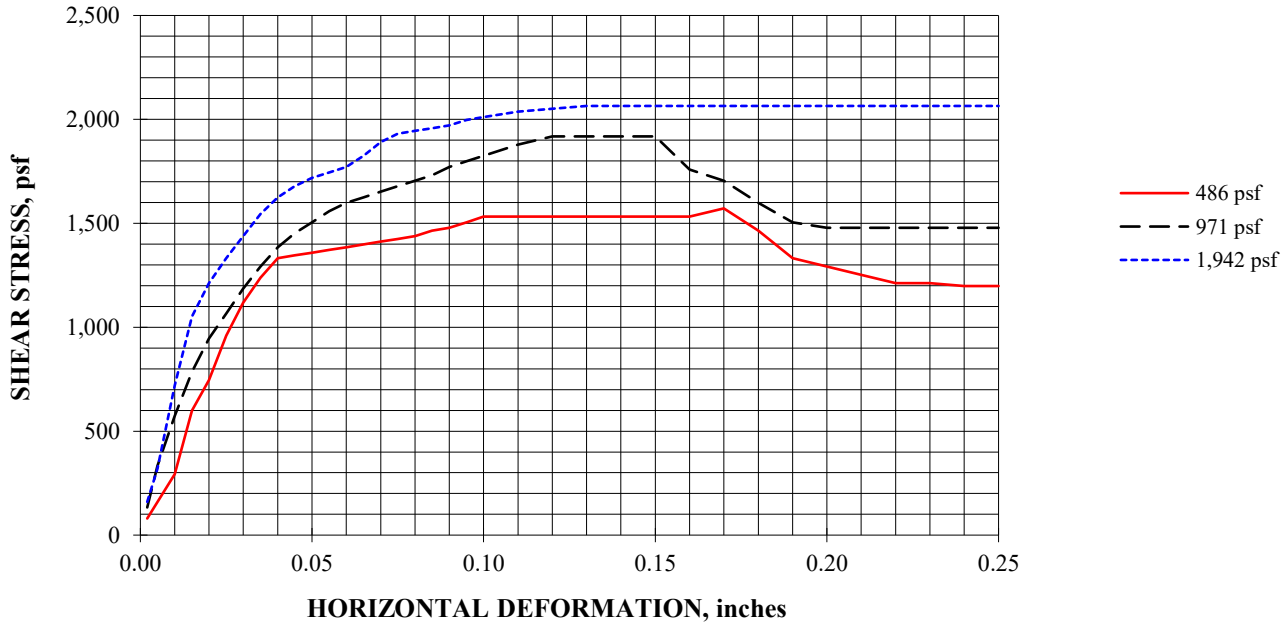
September 8, 2022

Sandy Lean Clay (CL)

Compacted to 90% RC, saturated

SPECIFIC GRAVITY: 2.70 (assumed)

SAMPLE NO.:	1	2	3	AVERAGE
INITIAL				
WATER CONTENT, %	15.2	15.2	15.2	15.2
DRY DENSITY, pcf	102.8	102.8	102.8	102.8
SATURATION, %	64.2	64.2	64.2	64.2
VOID RATIO	0.639	0.639	0.639	0.639
DIAMETER, inches	2.410	2.410	2.410	
HEIGHT, inches	1.00	1.00	1.00	
AT TEST				
WATER CONTENT, %	32.7	33.3	33.4	
DRY DENSITY, pcf	103.5	105.6	107.7	
SATURATION, %	100.0	100.0	100.0	
VOID RATIO	0.628	0.595	0.564	
HEIGHT, inches	0.99	0.97	0.95	



City of SLO Mission Plaza
Restaurant and Café

305341-001

PARTICLE SIZE ANALYSIS

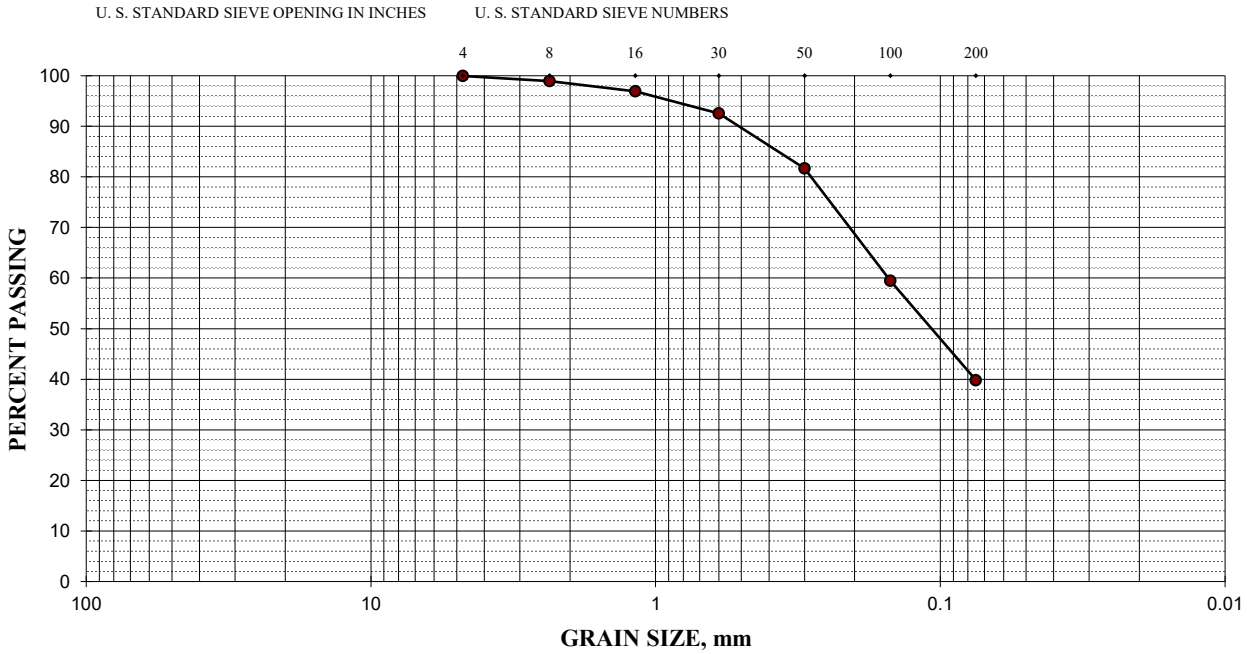
ASTM D 422-63/07; D 1140-017

Boring #1 @ 0.5 - 4.0'

September 8, 2022

Brown Poorly Graded Sand with Gravel (SP)

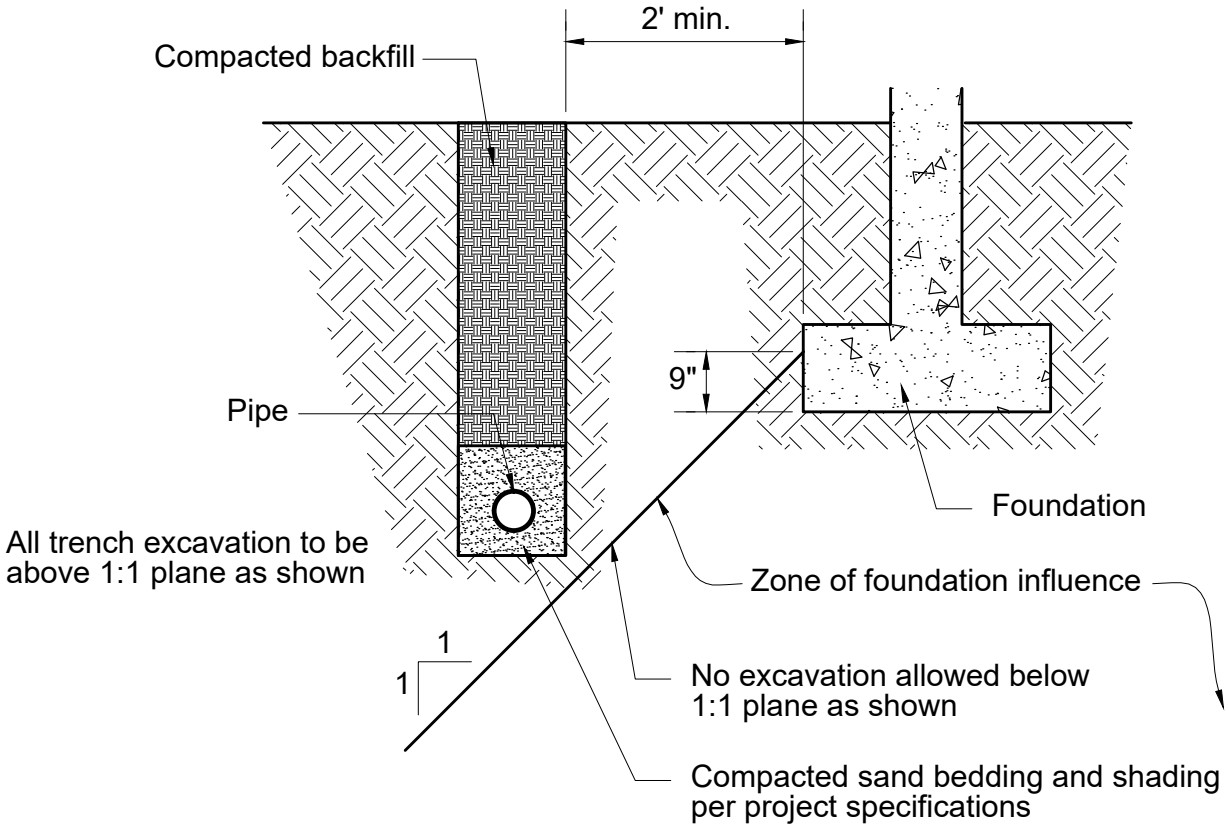
Sieve size	% Retained	% Passing
#4 (4.75-mm)	0	100
#8 (2.36-mm)	1	99
#16 (1.18-mm)	3	97
#30 (600-µm)	7	93
#50 (300-µm)	18	82
#100 (150-µm)	41	59
#200 (75-µm)	60	40



APPENDIX C

Typical Detail A: Pipe Placed Parallel to Foundations

TYPICAL DETAIL A
PIPE PLACED PARALLEL TO FOUNDATION

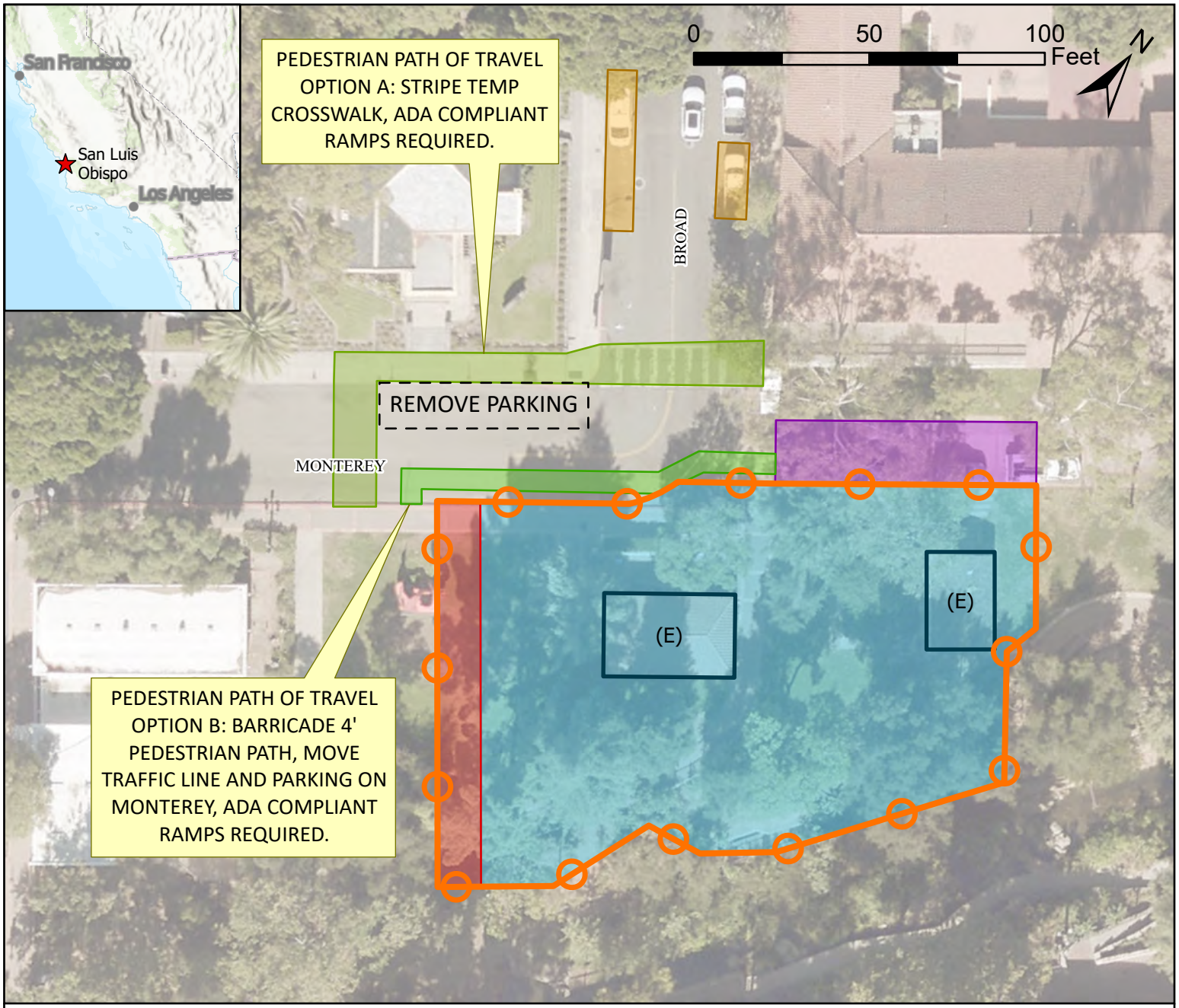


SCHEMATIC ONLY
NOT TO SCALE

Earth Systems Pacific

4378 Old Santa Fe Road
San Luis Obispo, CA 93401-8116
(805) 544-3276 • FAX (805) 544-1786
E-mail: esp@earthsystems.com

APPENDIX J – CONSTRUCTION STAGING PLAN



LEGEND

- CONTRACTOR LAY DOWN AREA
- CONTRACTOR PARKING
- PEDESTRIAN ACCESS. MAINTAIN DURING CONSTRUCTION - Opt. A
- PEDESTRIAN ACCESS. MAINTAIN DURING CONSTRUCTION - Opt. B
- APPROXIMATE AREA OF WORK
- PRIVATE VEHICLE ACCESS. MAINTAIN APPROX. 18' WIDE CLEAR PATH DURING CONSTRUCTION
- APPORXIMATE FENCE LINE
- (E) BUILDINGS

city of san luis obispo

MISSION PLAZA IMPROVEMENTS
CONSTRUCTION STAGING PLAN

2/27/2024

APPENDIX K – PHOTOS OF EXISTING RESTROOM CHASE