Village of Taos Ski Valley Taos Mountain Lodge Remodel/Addition Taos Ski Valley, NM

PROJECT MANUAL Construction Documents Issue Date: October 18th, 2018

Client:	Company Village of Taos Ski Valley 7 Firehouse Road Taos Ski Valley, NM 87525 575.776-8220 phone	People Richard Wilson – Village Building Inspector <u>rich@vtsv.org</u>
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Village of Taos Ski Valley Taos Mountain Lodge Remodel/Addition Project Manual DATE: October 18, 2018

Table of Contents

NO. PAGES

DIVISION 00 - PROCUR	REMENT AND CONTRACTING REQUIREMENTS	
	VILLAGE OF TAOS SKI VALLEY RFP	22
00 5000	SAMPLE CONTRACT (AIA 101)	7
00_7000	GENERAL CONDITIONS (AIA A201)	38
DIVISION 01 - GENERA	L REQUIREMENTS	
01 1000	SUMMARY OF WORK	6
01 2500	SUBSTITUTION PROCEDURES	3
CSI 13.1A	SUBSTITUTION REQUEST FORM	2
01 2600	CONTRACT MODIFICATION PROCEDURES	2
01 2900	PAYMENT PROCEDURES	4
01 3100	PROJECT MANAGEMENT & COORDINATION	9
01 3300	SUBMITTAL PROCEDURES	9
01 4000	QUALITY REQUIREMENTS	7
01 5000	TEMPORARY FACILITIES & CONTROLS	7
01 6000	PRODUCT REQUIREMENTS	4
01 7300	EXECUTION REQUIREMENTS	9
01 7500	STARTING AND ADJUSTING	2
01 7700	CLOSEOUT PROCEDURES	6
01 7800	CLOSEOUT SUBMITTALS	5
01 7823	OPERATIONS AND MAINTENANCE DATA	7
01 7839	PROJECT RECORD DOCUMENTS	3
01 7900	DEMONSTRATION & TRAINING	4
DIVISION 02 – EXISTIN	G CONDITIONS	
02 4119	SELECTIVE DEMOLITION	5
	-E	
03 0130	MAINTENANCE OF CAST-IN-PLACE CONCRETE	10
03 1000	CONCRETE FORMING & ACCESSORIES	4
03 1119	INSULATED CONCRETE FORM	7
03 2000		, 2

03 2000	CONCRETE REINFORCEMENT	2
03 3000	CAST-IN-PLACE-CONCRETE	7
03 3616	REACTIVE CHEMICAL CONCRETE STAIN	6
03 5413	GYPSUM CEMENT UNDERLAYMENT	3

DIVISION 04 MASONRY	1	
04 2200	CONCRETE UNIT MASONRY	5
04 4700	MANUFACTURED MASONRY	4
DIVISION 05 - METALS		
05 0500	Shop Applied Finishes	5
05 1000	STRUCTURAL STEEL	5
05 5000	METAL FABRICATIONS	7
05 5100	METAL STAIRS	8
DIVISION 06 – WOOD,	PLASTICS, AND COMPOSITES	
06 1000	ROUGH CARPENTRY	3
06 1053	MISCELLANEOUS ROUGH CARPENTRY	5
06 1323	HEAVY TIMBER CONSTRUCTION	3
06 1500	WOOD DECKING	3
06 1600	SHEATHING	2
06 1800	GLUED-LAMINATED CONSTRUCTION	3
06 2013		4
06 4023	PLASTIC LAMINATE FACED ARCHITECTURAL CABINETS	8
06 4113	WOOD VENEER FACED ARCHITECTURAL CABINETS	7
06 4800	wood frames	5
06 6400	PLASTIC PANELING	3
DIVISION 07 - THERMA	L & MOISTURE	
07 324	PRE-APPLIED SHEET MEMBRANE WATERPROOFING	3
07 1326	SELF-ADHERING SHEET WATERPROOFING	3
07 1416	FLUID-APPLIED WATERPROOFING	4
07 2100	BUILDING INSULATION	5
07 2500	WEATHER BARRIERS	2
07 2600	UNDER-SLAB VAPOR RETARDER	3
07 4113	METAL ROOF PANELS	10
07 4610	SIDING	9
07 6200	SHEET METAL FLASHING AND TRIM	5
07 7200		3
07 7253	STANDING SEAM SNOVY FENCE	
07 8413		6
07 9213	ELASTOMERIC JOINT SEALANTS	8
DIVISION 08 - OPENING	GS	
08 11 13	HOLLOW METAL DOORS AND FRAMES	6
08 1416		4
08 2210	COMMERCIAL WOOD AND CLAD DOORS	5
08 5550		6
08 / 100		9
		7
		4

DIVISION 09 – FINISHES

09 2423	PORTLAND PLASTER	6
09 2600	GYPSUM BOARD ASSEMBLIES	4
09 3113	CERAMIC TILING	9
09 5113	ACOUSTICAL PANEL CEILINGS	5
09 6400	WOOD FLOORING	3
09 6500	RESILIENT FLOORING, BASE AND ACCESSORIES	6
09 6813	TILE CARPETING	6
09 7213	FIBER-REINFORCED PLASTIC (FRP) FABRICATIONS	3
09 9100	PAINTING	7
09 9300	STAINING AND TRANSPARENT COATINGS	5

DIVISION 10 – SPECIALTIES

10 1300	DIRECTORIES	4
10 1400	BUILDING SIGNAGE	4
10 1430	EXTERIOR SIGNAGE	3
10 2600	WALL AND DOOR PROTECTION	3
10 2813	TOILET ACCESSORIES	3
10 4400	FIRE PROTECTION SPECIALTIES	5

DIVISION 14 – CONVEYING EQUIPMENT

12

DIVISION 22 – PLUMBING

22 0500	BASIC PLUMBING MATERIALS AND METHODS	6
22 0719	PLUMBING PIPING INSULATION	3
22 1005	PLUMBING PIPING	9

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING

0
4
6
8

DIVISION 26 - ELECTRICAL

26 0500	BASIC ELECTRICAL MATERIALS AND METHODS	7
26 0510	WIRING METHODS	7
26 2701	ELECTRICAL SERVICE ENTRANCE	2
26 5150	GENERAL LIGHTING	2

DIVISION 27 – COMMUNICATIONS / IT

27 1000	STRUCTURED CABLING	6

DIVISION 31 – EARTHWORK

5
I
2
2
2
I

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 4 3	INTERLOCKING CONCRETE PAVERS	7
Section 100	MATERIALS	I
Section 101	PORTLAND CEMENT CONCRETE	16
Section 102	STEEL REINFORCEMENT	2
Section 121	PLASTIC PIPE	3
Section 129	DUCTILE IRON PIPE	T
Section 301	SUBGRADE PREPARATION	3
Section 302	AGGREGATE BASE COURSE CONSTRUCTION	4
Section 336	ASPHALT CONCRETE PAVING	9
Section 340	PORTLAND CEMENT CONCRETE CURBS, GUTTERS,	4
	WALKS, DRIVEWAYS, ALLEY INTERSECTIONS, SLOPE	
	PAVING, AND MEDIAN PAVING	
Section 400	TRAFFIC CONTROL	I

DIVISION 33 – UTILITIES

RICAL UTILITY SERVICES	3
CH AND BORING FOR UTILITIES	I
CHING, EXCAVATION, AND BACKFILL	10
LLATION OF WATER SERVICE LINES	4
ARY AND STORM SEWER FACILITIES	22
ARY SEWER SERVICE LINES	2
DRARY TRAFFIC CONTROL	6
	RICAL UTILITY SERVICES CH AND BORING FOR UTILITIES CHING, EXCAVATION, AND BACKFILL LLATION OF WATER SERVICE LINES ARY AND STORM SEVVER FACILITIES ARY SEVVER SERVICE LINES DRARY TRAFFIC CONTROL

END OF TABLE OF CONTENTS

VILLAGE OF TAOS SKI VALLEY – ADMINSTRATION BUILDING

DIVISION 00 – PROCUREMENT & CONTRACTING REQUIREMENTS

VILLAGE OF TAOS SKI VALLEY Request for Proposals (RFP)– #2019-08RFP Taos Mountain Lodge Remodel/Addition Village of Taos Ski Valley (VTSV) Invitation to Bid

SUBMIT PROPOSAL TO: Nancy Grabowski Finance Director/Procurement Officer Village of Taos Ski Valley 7 Firehouse Road Taos Ski Valley, New Mexico 87525 (575) 776-8220

DEADLINE DATE FOR SUBMISSIONS: January 4, 2019 at 4PM

This announcement does not contain the following contract documents

- Village of Taos Ski Valley Project Manual.
- Village of Taos Ski Valley Construction Documents
- For these important Construction Documents and any documents such as addenda issued during the bidding process please refer to the Village of Taos Ski Valley website. http://www.vtsv.org/recentposts
- Reference of the complete Construction Documents is essential for a proposal to be deemed complete.

		~ •	~		
Offeror (Company)	Address	City	State	Zip Code	
	11001000	erty	~	here and her	

Signature of member authorized to sign for firm (Title). (I certify that I have proposed according to the specifications and conditions of this proposal).

Doing Business under the Company Name of:

Telephone Number with area code

Facsimile Number with area code

Email address

Section 1 - Instructions

The Village of Taos Ski Valley is requesting competitive sealed proposals for the selection of a construction contractor for the Village of Taos Ski Valley- Taos Mountain Lodge Remodel/Addition #2019-08 RFP. Property address: 1346 State Hwy 150, Taos Ski Valley.

1. INTRODUCTION

The Village of Taos Ski Valley (VTSV) invites general contractors (offerors) to submit proposals in accordance with the outlines and specifications contained in this Request for Proposals (RFP). This RFP contains specific requests for information. In responding to this RFP, offerors are encouraged to provide any additional information they believe is relevant. This RFP is being issued pursuant to the New Mexico Procurement Code and shall be governed by its provision.

2. <u>SEQUENCE OF EVENTS</u>

EventTentative DateRelease of RFPNovember 15, 2018Mandatory Walkthrough (at property address above)December 6, 2018 (1 pm)Last day for written question submissionDecember 20, 2018Last day for responses to questionsDecember 28, 2018Submission / Due Date of ProposalsJanuary 4, 2019, (4pm)Evaluation of ProposalsJanuary 7-18, 2019PresentationsJanuary 13, 2019

The selection date is subject to extension at the discretion of the Village of Taos Valley. The effective date of the contract is tentative and depends on the selection date and the time required for contract negotiation and preparation.

The events identified in the schedule above are briefly described below:

A. Release of RFP

Notice of the RFP will be published at least once in the local newspaper of general circulation 10 days prior to opening bid. Prospective offerors may download this RFP from the VTSV website. **http://www.vtsv.org/recentposts** and direct questions about this RFP to:

Mr. Richard Willson Village of Taos Ski Valley 7 Firehouse Road Taos Ski Valley, New Mexico 87525 (575) 776-8220/(505) 980-1469 rich@vtsv.org

B. Submission & Opening of Proposals

Offerors should provide one (1) original proposal marked "Original" and 3 identical copies of their proposal with supporting documentation for a total of four (4) proposals. All proposals must be in a **sealed envelope, box, or package**. Every proposal must be signed, and the authority of the individual signing must be stated on the proposal. Responses sent via facsimile or emails are not acceptable.

The deadline for receipt of proposals by VTSV is **January 4, 2019** no later than 4:00 p.m. local time. Proposals will be time-stamped and dated upon receipt.

All proposals shall be submitted to the Village of Taos Ski Valley in sealed envelopes marked #2019-08 RFP, Village of Taos Ski Valley, Taos Mountain Lodge Remodel/Addition, with their company name and address.

The proposals shall be addressed to:

Nancy Grabowski/ Certified Purchasing Officer Village of Taos Ski Valley 7 Firehouse Road Taos Ski Valley, New Mexico 87525 Phone: (575) 776-8220

A proposal may be modified by an offeror prior to the deadline for submission of proposals by delivery of a written modification to the above address. The sealed envelope shall be marked **"Modification to Proposal #2019-08 RFP for Village of Taos Ski Valley Taos Mountain Lodge Remodel/Addition"**

The proposal may be withdrawn prior to the deadline of submission of proposals by delivering a properly executed written notice to the Village of Taos Ski Valley at the address listed above.

Any proposal or modification received after the deadline for submission of proposals will be considered late. A late proposal or late modification will be considered non-responsive and will not be evaluated unless it would have been timely but for the action or inaction of the Village of Taos Ski Valley.

Proposals are due at the Village of Taos Ski Valley Office located at 7 Firehouse Road, Taos Ski Valley, New Mexico, 87525, on **January 4, 2019 4:00 p.m. local time.** Proposals will not be opened publicly, but will be available for public inspection after the contract has been awarded, reviewed by the Village of Taos Ski Valley legal department, approved by the Village Council and executed by both parties.

PLEASE NOTE THERE IS NO GUARENTEED OVERNIGHT DELIVERY TO THE VILLAGE OF TAOS SKI VALLEY.

C. Evaluation of Proposals

Proposals will be evaluated by the Village of Taos Ski Valley Committee using the criteria listed in Sections 14-16. During the evaluation process, the Selection Committee may seek clarification from offerors.

D. Selection of Offerors

The selection of contractor(s) and or individuals will be made by the Village of Taos Ski Valley. The firms or individuals selected to perform the work, and those not selected, will be notified in writing by the Village of Taos Ski Valley.

E. Contract Approval

The contract shall be reviewed and approved as to form, legal sufficiency and budget requirements by the Village of Taos Ski Valley. Contract award is contingent upon the Village securing funds or obtaining a funding source.

3. ADDENDA TO RFP

If there are any addenda to the RFP, they shall be in writing from the Village of Taos Ski Valley and shall be emailed to all firms and individuals who attended the Mandatory Pre-Bid Meeting and posted on the VTSV website. Addenda shall be distributed with sufficient time to allow offerors to consider the addenda in preparing their proposals. If necessary, the deadline for submission of proposals shall be extended by the addendum.

4. DUPLICATIONS, REJECTIONS AND TERMINATION

DUPLICATE RESPONSES: No more than one (1) Response from any Respondent, including its subsidiaries, affiliated companies, and franchisees will be considered by the Village. In the event multiple Responses are submitted in violation of this provision, the Village will have the right to determine which Response will be considered, or at its sole option, reject all such multiple Responses.

REJECTIONS: The Village reserves the right to reject any or all Responses, or to accept or reject any Response in part, and to waive any minor informality or irregularity in Responses received, if it is determined by the Purchasing Officer or designee that the best interest of the Village will be served by doing so. The Village may reject any Response from any person, firm or corporation in arrears or in default to the Village on any contract, debt, or other obligation, or if the Respondent is debarred by the Village from consideration for a contract award, or if Respondent has committed a violation of the ethics or anti-kickback provisions of the Village's Procurement Ordinance which resulted in a termination of a contract or other material sanction within the two (2) years immediately preceding the date of issuance of this document.

TERMINATION: The Village of Taos Ski Valley reserves the right to terminate this RFP at any time and for any reason. The issuance of the RFP, the receipt of proposals or the selection of a firm or individual in no manner obligates the Village of Taos Ski Valley to the eventual purchase of

services. This process is solely at the discretion of the Village of Taos Ski Valley and may be terminated without penalty or obligation at any time prior to the signing of a written contract.

- 5. <u>PROCUREMENT POLICY</u>: Procurement for the Village will be handled in a manner providing fair opportunity to all businesses. This will be accomplished without abrogation or sacrifice of quality and as determined to be in the best interest of the Village. The Chief Executive Officer has the vested authority to execute all Village contracts, subject to Council approval where required.
- 6. <u>COMPLIANCE WITH LAWS</u>: The Respondent must comply with all federal, state, and local laws and policies. The laws of the State of New Mexico shall govern this procurement and any agreement with Respondents that may result. In submitting a proposal, the Respondent represents that the Respondent has familiarized himself with the nature and extent of the RFP dealing with federal, state, and local requirements that are part of this RFP. The successful Respondent(s) shall perform work under the resultant Contract in strict accordance with the latest version of all State and local codes, ordinances, and regulations governing the work involved. All materials and labor necessary to comply with the rules, regulations, and ordinances shall be provided by the successful Respondent(s). In the event of a conflict between various codes and standards, the more stringent shall apply
- 7. <u>NON-DISCRIMINATION:</u> The Village will not contract with any person or firm that discriminates against employees or applicants for employment because of any factor not related to job performance. The Respondent must comply with all federal, state, and local laws and policies that prohibit discrimination in employment contracts. The Respondent must include in its subcontracts provisions that prohibit subcontractors from discriminating in their employment practices.

8. CONTRACT NEGOTIATIONS: TERMS AND CONDITIONS

All Responses must be firm for at least 120 days from the due date of the Response. If, for any reason, a contract is not executed with the selected Respondent within 30 days after notice of recommended award, then the Village may recommend the next most responsive and responsible Respondent. There is no contract until the Village's policies have been fulfilled. . Contract award is contingent upon the Village securing funds or obtaining a funding source.

- 9. <u>DISQUALIFICATION OF RESPONDENTS</u>: Any one or more of the following causes may be considered sufficient for the disqualification of a Respondent and the rejection of the Response:
 - a. Evidence of collusion among Respondents.
 - b. Lack of competency as revealed by either financial, experience, or equipment statements.
 - c. Lack of responsibility as shown by past work.

d. Uncompleted work under other contracts which, in the judgment of the Village, might hinder or prevent the prompt completion of additional work if awarded.

- 10. <u>DISCUSSIONS</u>: Discussions may be conducted with responsible Respondents, in order to clarify and assure full understanding of, and conformance to, the solicitation requirements. Discussions may be conducted with Respondents who submit Responses determined to be reasonably susceptible of being elected for award, but Responses may be accepted without such discussions. Respondents shall be accorded fair and equal treatment with respect to any opportunity for discussions and revisions of Responses. Such revisions may be permitted after submission and prior to award for the purpose of obtaining best and final offers. If during discussions there is a need for any substantial clarification of or change in the RFP, the RFP shall be amended to incorporate such clarification or change. The Respondent shall reduce any substantial oral clarification of a Response to writing.
- 11. <u>DISCLOSURE OF CONTENTS</u>: All information provided in the Response shall be held in confidence and shall not be revealed or discussed with competitors, until after award of the contract except as provided by law or court decision. All material submitted with the Response becomes the property of the Village and may be returned only at the Village's option. Respondents must make no other distribution of their Responses other than authorized by this RFP. A Respondent who shares cost information contained in its Response with other Village personnel or competing Respondent personnel shall be subject to disqualification. Respondents shall not be provided any information about other Responses or prices or where the Respondent stands in relation to others at any time during the evaluation process. Any request for such information by a Respondent, its subcontractor or an affiliated party may be viewed as a compromise to the evaluation process and the requesting Respondent may be eliminated from further consideration.
- 12. **PROPOSAL EVALUATION:** An evaluation committee will perform the evaluation of proposals. Points will be allocated by each member. Each member's point totals will be translated into a numeric ranking of all proposals. The individual member rankings will be totaled together to determine the overall ranking of proposals. The Evaluation Committee to will conduct interviews with the three highest-ranked proposals. The Evaluation Committee may award the selection based on the results of the shortlisting. If interviews are held, rankings from the shortlisting are weighted 40% and the interview rankings are weighted 60% to determine final award. If fewer than three proposals are received the Evaluation Committee may recommend an award to the Governing Body for approval or direct that the RFP be reissued. During this time, the Village of Taos Ski Valley may initiate discussions with Respondents who submit responsive or potentially responsive proposals for the purpose of clarifying aspects of the proposals, but proposals may be accepted and evaluated without such discussion. Discussions SHALL NOT be initiated by the Respondents.
- 13. <u>PROTESTS</u>: Any protest by a Respondent must be timely and in conformance with Section 13-1-172 NMSA 1978 and applicable procurement regulations. Protests must be written and must include the name and address of the protestor and the request for proposals number. It must also contain a statement of grounds for protest including appropriate supporting exhibits, and it must specify the ruling requested from the Village of Taos Ski Valley. The protest must be delivered to the Village of Taos Ski Valley, Finance Director (mailing address) PO Box 100, Taos Ski Valley, NM 87525, (physical address) 7 Firehouse Rd, Taos Ski Valley, NM 87525 within 24 hours after the

facts or occurrences giving rise thereto, but in no case later than 15 calendar days after the facts or occurrences giving rise thereto. Protests received after the 15-day period deadline will not be accepted.

In the event of a timely protest under this section, the Village of Taos Ski Valley shall not proceed further with procurement unless the Procurement Officer makes a determination that the award of Agreement is necessary to protect substantial interests of the Contracting Agency (13-1-173 NMSA 1978). The Procurement Officer or designee shall have the authority to take any action reasonably necessary to resolve a protest of an aggrieved Respondent concerning procurement. The Procurement Officer or designee shall promptly issue a determination relating to the protest. The aggrieved Respondent has the right to judicial review of the determination pursuant to 13-1-183 NMSA 1978.

14. PROPOSAL FORMAT

Proposals must at a minimum contain the following information:

- 1. Completed RFP form with the name, address, and phone number of the general contractor.
- 2. Record of past performance on projects of similar size and scale.
- **3.** Completed Bid Form (Appendix E). **Place Appendix E in a separate envelope marked Appendix E.**
- 4. Subcontractor Listing (Appendix F).
- 5. Complete the forms attached as appendices.
 - a. Appendix A: Acceptance of Proposal
 - b. Appendix B: Non-Collusion Affidavit
 - c. Appendix C: Bid Security and Agent's Affidavit
 - d. Appendix D Campaign Contribution Disclosure Form
 - e. Appendix E: Bid Form
 - f. Appendix F: Subcontractor Listing
- 6. Copy of New Mexico Contractor's License.
- 7. Copy of NM Dept. of Labor Public Works registration.
- 8. Copy of NM Veteran's Preference Certificate (if applicable).
- 9. Copy of NM Resident's Bidder Preference Certificate (if applicable).
- 10. W-9 form

15. <u>SCOPE OF WORK</u>

The Village of Taos Ski Valley contractors to perform general construction of Village of Taos Ski Valley Administration Building to include but not limited to renovation and addition to existing two story wood frame building, change of occupancy group, mixed use "A-3" Assembly and "B" Business, Type VB construction. The offeror will be expected to provide construction and general services, including, but not limited to, the following areas:

A. Work covered by contract documents;

- B. Coordination with owners representative;
- C. Work restrictions and prohibited activities;
- D. Specifications and drawing conventions;
- E. Access to site;
- F. Labor laws, including wage determinations and;
- G. Bond matters; performance and payment bonds

16. EVALUATION (Rating Criteria)

The responsible offeror(s) whose proposal(s) are most advantageous to the Village shall be selected to perform the services. The weight to be given to the evaluation factors is set forth below. COST IS A FACTOR, BUT THE INCLUSION OF COST AS A FACTOR DOES NOT REQUIRE THE VILLAGE TO SELECT THE LOWEST COST PROPOSAL. All items listed in Section 7 must be included. **Incomplete proposals are considered to be non-responsive and will not be evaluated**.

- A. Complete proposal All items listed in section 7 no points, incomplete proposals will be considered non-responsive and will not be evaluated.
- B. Past performance and references on projects of similar size and scope (30 points)
- C. Project team and sub-contractors (10 points)
- D. Price/Bid/Cost/ (40 points)
- E. Presentation (10 points)
- F. Veterans preference (5 points)
- G. Resident contractor preference (5 points)

17. <u>AWARD</u>

Awards may be in the form of multiple contract awards to one or more offerors.

The Village of Taos Ski Valley shall interview the contractors that submit responsive or potentially responsive proposals. A detailed Schedule of Values shall be provided by the bidder(s) whose bid The Village determines to be the most advantageous and is required before a contract can be awarded.

18. FINAL CONTRACT NEGOTIATION

The contract between the Village and the successful offeror(s) shall contain substantially the following terms and conditions:

- **A. Scope of Work:** This portion of the contract will incorporate the scope of work in Sections 7 and 6 above and the description of services from the offerors proposal.
- **B.** Compensation: Proposals should not include gross receipts tax. Gross receipts should be added separately to each final invoice.
- **C. Term:** It is the intent of the owner to complete the work within 240 calendar days from the Notice to Proceed.
- **D. Termination:** The contract may be terminated by either of the parties thereto upon written notice delivered to the other party at least 30 days prior to the intended date of termination. By

such termination, neither party may nullify obligations or liabilities already incurred for performance or for failure to perform prior to the date of termination.

- **E. Status of Contractor:** The Contractor and his agents and employees are independent contractors performing professional services for the Village of Taos Ski Valley and are not employees of the Village of Taos Ski Valley. The Contractor and his agents and employees shall not accrue leave, retirement, insurance, bonding, use of state vehicles, or any other benefits afforded to employees of the Village of Taos Ski Valley (if any) by virtue of the contract.
- **F.** Assignment: The Contractor shall not assign or transfer any interest in the contract or assign any claims for money due or to become due under the contract without the prior written approval of the Village of Taos Ski Valley.
- **G. Subcontracting:** The Contractor shall not subcontract any portion of the services to be performed under the contract without the prior written approval of the Village of Taos Ski Valley.
- **H. Records and Audit:** The Contractor shall maintain detailed time records, which indicate the date, time, and nature of services rendered. These records shall be subject to inspection by the Village of Taos Ski Valley.
- I. Billing: All statements for cost incurred by the contractor and for services rendered shall be submitted on a monthly basis and shall reveal, on a daily basis, time expended.
- J. Product of Service/Copyright: Nothing produced, in whole or in part, by the Contractor under the contract shall be the subject of an application for copyright by or on behalf of the Contractor.
- **K.** Conflict of Interest: The Contractor shall warrant that he has no interest and shall not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance of services required under the contract.
- L. Amendment: The contract shall not be altered, changed, or amended except by an instrument in writing executed by both parties.
- **M. Merger:** The contract shall incorporate all the agreements, covenants, and understandings between the parties hereto concerning the subject matter thereof. No prior agreement or understanding, verbal or otherwise, of the parties or their agents shall be valid or enforceable unless embodied in the contract.
- N. Applicable Law: The contract shall be governed by the laws of the State of New Mexico.
- **O. Waiver:** The contract shall contain a provision that states that no waiver of any breach of the contract or any of the terms or conditions thereof shall be held to be a waiver of any other or subsequent breach; nor shall any waiver be valid, alleged or binding unless the same shall be in writing and signed by the party alleged to have granted the waiver.

APPENDIX A

VILLAGE OF TAOS SKI VALLEY ACCEPTANCE OF PROPOSAL

NOTICE: TO BE VALID, THE PROPOSAL MUST BE SIGNED BELOW.

The undersigned certifies that he/she has read and understood the following general conditions and that the firm represented accepts the conditions and submits the attached proposal in full compliance with the General Proposal Conditions.

Name of Firm

Signature of Owner, Partner, Officer or Authorized Agent

Mailing Address of Firm

City, State and Zip Code

Telephone Number

Fax Number

Date

<u>APPENDIX B</u>

NON-COLLUSION AFFIDAVIT

In witness whereof, the parties have executed this agreement as of the date of . 2019-08 RFP Village of Taos Ski Valley Taos Mountain Lodge **Remodel/Addition.**

In acknowledgement of receipt of the Request for Proposals, the undersigned agrees that he/she has received a complete copy of this Request for Proposal. The undersigned further agrees that he/she has read this Request for Proposal and agrees to all specifications, general requirements, and terms and conditions of said Request. This form must be signed and returned with the response to Request for Proposal. Non-compliance will cause said proposal response to be declared nonresponsive.

The undersigned duly authorized to represent the persons, firms, and corporations joining and participating in the submission of the foregoing proposal, (such persons, firms and corporation hereinafter referred to as the Offeror) being duly sworn, on his/her oath, state that to the best of his/her belief and knowledge no person, firm or corporation, nor any person duly representing the same joining and participating in the submission of the foregoing proposal, has directly or indirectly entered into any agreement or arrangement with any other employee thereof, or any person, firm or corporation under contract with Village of Taos Ski Valley whereby the Offeror, in order to induce the acceptance of the forgoing proposal by Village of Taos Ski Valley, has paid or is to pay to any other Offeror or to any of the aforementioned persons anything of value, whatever, and that the Offeror or has directly or indirectly entered into any arrangement or agreement with any other Offeror or Offerors which tends to or does lessen or destroy free competition in the letting of the award sought for by the foregoing proposal.

Firm:		
Represented by:		
Title:		
Address:		
Telephone Number:		
Email:		
Signature:		

APPENDIX C

AGENT'S AFFIDAVIT

		THIS FORM MUST BE USED BY
(To be filled in by Agent)		SURETY
STATE OF)	
) ss.	
COUNTY OF)	
	, being first duly sworn, depos	es and says that he /
she is the duly appointed agent for and is license	ed in the State of New Mexico.	
Deponent further states that a certain bond wa	s given to indemnify the Villag	e of Taos Ski Valley in
connection with the Village of Taos Ski Valle	y Taos Mountain Lodge R	emodel/Addition.
dated theday of, 2018	, executed by	
Contractor, as principal, and Deponent further states that said bond was writte same has been or will be collected by him/her retained by him/her.	, as surety en, signed, and delivered by hin ; and that the full commission	y, signed by this Deponent; and m/her; that the premium on the n thereon has been or will be
Subscribed and sworn to before me, a notary pub day of, 2018.	olic in and for the County of	, this
	Notary Public	c
My Commission Expires:		
AGENT'S ADDRESS:		
Telephone		

APPENDIX D

CAMPAIGN CONTRIBUTION DISCLOSURE FORM

Pursuant to NMSA 1978, § 13-1-191.1 (2006), any person seeking to enter into a contract with any state agency or local public body for professional services, a design and build project delivery system, or the design and installation of measures the primary purpose of which is to conserve natural resources, must file this form with that state agency or local public body. This form must be filed even if the contract qualifies as a small purchase or a sole source contract. The prospective contractor must disclose whether they, a family member or a representative of the prospective contractor has made a campaign contribution to an applicable public official of the state or a local public body during the two years prior to the date on which the contractor submits a proposal or, in the case of a sole source or small purchase contract, the two years prior to the date the contractor signs the contract, if the aggregate total of contributions given by the prospective contractor, a family member or a representative of the prospective contractor, a family member or a representative of the prospective contractor, a family member or a representative of the prospective contractor signs the contract, if the aggregate total of contributions given by the prospective contractor, a family member or a representative of the prospective contractor to the public official exceeds two hundred and fifty dollars (\$250) over the two year period.

Furthermore, the state agency or local public body shall void an executed contract or cancel a solicitation or proposed award for a proposed contract if: 1) a prospective contractor, a family member of the prospective contractor, or a representative of the prospective contractor gives a campaign contribution or other thing of value to an applicable public official or the applicable public official's employees during the pendency of the procurement process, or 2) a prospective contractor fails to submit a fully completed disclosure statement pursuant to the law.

THIS FORM MUST BE FILED BY ANY PROPECTIVE CONTRACTOR WHETHER OR NOT THEY, THEIR FAMILY MEMBER, OR THEIR REPRESENTATIVE HAS MADE ANY CONTRIBUTIONS SUBJECT TO DISCLOSURE. The following definitions apply:

"**Applicable public official**" means a person elected to an office or a person appointed to complete a term of an elected office, who has the authority to award or influence the award of the contract for which the prospective contractor is submitting a competitive sealed proposal or who has the authority to negotiate a sole source or small purchase contract that may be awarded without submission of a sealed competitive proposal.

"Campaign Contribution" means a gift, subscription, loan, advance or deposit of money or other thing of value, including the estimated value of an in-kind contribution, that is made to or received by an applicable public official or any person authorized to raise, collect or expend contributions on that official's behalf for the purpose of electing the official to federal, statewide or local office. "Campaign Contribution" includes the payment of a debt incurred in an election campaign, but does not include the value of services provided without compensation or unreimbursed travel or other personal expenses of individuals who volunteer a portion or all of their time on behalf of a candidate or political committee, nor does it include the administrative or solicitation expenses of a political committee that are paid by an organization that sponsors the committee.

"Family Member" means spouse, father, mother, child, father-in-law, mother-in-law, daughter-inlaw, or son-in-law. "**Pendency of the procurement process**" means the time period commencing with the public notice of the request for proposals and ending with the award of the contract or the cancellation of the request for proposals.

"**Person**" means any corporation, partnership, individual, joint venture, association or any other private legal entity.

"**Prospective contractor**" means a person who is subject to the competitive sealed proposal process set forth in the Procurement Code or is not required to submit a competitive sealed proposal because that person qualifies for a sole source or a small purchase amount.

"**Representative of a prospective contractor**" means an officer or director of a corporation, a member or manager of a limited liability corporation, a partner of a partnership or a trustee of a trust of the prospective contractor.

DISCLOSURE OF CONTRIBUTIONS:		
Contribution made by:		_
Relation to Prospective Contractor:		_
Name of Applicable Public Official:		_
Date Contribution(s) made:		
Amount(s) of Contribution(s) made:		
Nature of Contribution(s):		_
Purpose of Contribution(s):		
(Attach extra pages if necessary)		
Title (position)	Signature Date	

-OR-

NO CONTRIBUTIONS IN THE AGGREGATE TOTAL OVER TWO HUNDRED FIFTY DOLLARS (\$250) WERE MADE to an applicable public official by me, a family member or representative.

Title (position)	Signature Date

APPENDIX E

BID FORM (Lump Sum)

BIDDER'S	Name	and	Address:
----------	------	-----	----------

Telephone: Fax: Federal Tax ID #: New Mexico Tax ID #: CID License #

#2019-08 RFP

PROJECT NAME: Village of Taos Ski Valley Taos Mountain Lodge Remodel/Addition

LOCATION: **Taos Ski Valley,** 1346 NM 150 Village of Taos Ski Valley, NM 87525

This Bid is submitted to :

Nancy Grabowski Finance Director 7 Firehouse Road Taos Ski Valley, NM 87525 575-776-8220

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with the Owner in the form included in the Bidding Documents to perform and furnish all Work as specified or indicated in the Bidding Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. The Bidder accepts all of the terms and conditions of the Request for Proposal (RFP), including without limitation those dealing with the disposition of bid security and other Bidding Documents. This Bid will remain subject to acceptance for forty-five (45) days after the day of Bid opening. The Bidder shall sign and submit the Agreement between Owner and Contractor (hereinafter called Agreement) with the Bonds and other documents required by the Bidding Requirements within fifteen (15) days after the date of the Owner's Notice of Award.

3. In submitting this Bid, the Bidder represents, as more fully set forth in the Agreement, that:

A. the Bidder has examined copies of all the Bidding Documents and of the following Addenda (receipt of all of which is hereby acknowledged):

No <u>.</u>		Date:
No <u>.</u>		Date:
No <u>.</u>		Date:
No <u>.</u>	_Title:	Date:

B. the Bidder has familiarized himself with the nature and extent of the Bidding Documents, Work, site, locality, and all local conditions, laws, and regulations that in any manner may affect cost, progress, performance, or furnishing of the Work;

C. the Bidder has carefully studied all reports and drawings of subsurface conditions which are identified in the Information Available to Bidders on the VTSV website and accepts the determination set forth in the Information Available to Bidders of the extent of the technical data contained in such reports and drawings upon which the Bidder is entitled to rely;

D. the Bidder has correlated the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Bidding Documents;

E. the Bidder has given the Design Professional written notice of all conflicts, errors, and discrepancies that he has discovered in the Bidding Documents, and the written resolution thereof by the Design Professional is acceptable to the Bidder;

F. this Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; the Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; the Bidder has not solicited or induced any person, firm, or corporation to refrain from bidding; and the Bidder has not sought by collusion to obtain for himself any advantage over any other Bidder or over the Owner;

G. the Bidder acknowledges that he has attended any mandatory pre-bid conference scheduled by the Owner or the Design Professional pertaining to this project;

H. the Bidder agrees to show clearly on the envelope in which the Bid is submitted the Project Name and RFP Number; and,

I. the Bidder will complete the Work for the following price (<u>do not</u> include any gross receipts tax in the price).

4. Bids shall be presented in the form of a total Base Bid proposal in Schedule of Values format for a Lump Sum Contract. A bid must be submitted on all bid items; segregated bids will not be selected by the Owner.

- A. LUMP SUM BASE BID (<u>do not</u> include any gross receipts tax in the price). (please use typewriter or print legibly in ink) Base Bid (use words):
 - Lump Sum to be inclusive of a \$25,000 cash allowance for materials testing and owner's contingency.

(\$

16

)

All specific cash allowances are included in the price(s) set forth above.

5. The Bidder agrees that:

A. The Work to be performed under this Contract shall commence not later than ten (10) consecutive days after the date of original written Notice to Proceed, and that Substantial Completion shall be achieved as stated below except as hereafter extended by valid written Change Order by the Owner;

• 240 calendar days after the date of original written Notice to Proceed

B. Should the Contractor neglect, refuse, or otherwise fail to complete the Work within the time specified, the Contractor agrees to pay to the Owner in partial consideration for the award of this Contract the amount of **Five Hundred** Dollars (**\$500**) per consecutive day, not as a penalty, but as liquidated damages for such breach of the Contract.

C. The above prices shall include all labor, materials, removal, overhead, profit, insurance, taxes (<u>not including gross receipts tax</u>), etc., to cover the finished work of the several kinds called for. Changes shall be processed in accordance with the Contract Documents.

D. It is understood that the Owner reserves the right to reject any or all Bids and to waive any technical irregularities in the bidding.

- 6. The following documents are attached to and made a condition of this Bid:
 - A. Acceptance of Proposal
 - B. Non-Collusion Affidavit
 - C. Bid Security with Agent's Affidavit;
 - D. Campaign Contribution Disclosure Form;
 - E. Subcontractor Listing
 - **F.** Copy of NM Contractor License #;
 - G. Copy of Department of labor Public Works Registration;
 - H. Copy of NM Veteran's Preference Certificate (If applicable);
 - I. Copy of NM Resident's Bidder Preference Certificate (If applicable); and
 - J. List of references of similar project completion
- 7. The terms used in this Bid and the Bidding and Contract Documents which are defined in the Conditions of the Construction Contract (General, Supplementary, and Other Conditions), included as part of the Bidding Documents, have the meanings assigned to them in those Conditions.

8. Tł	he Bidder is a(n):	
A. II	NDIVIDUAL:	
By:		
		(Individual's Signature)
Doin	a husiness as	
Duri		
Busin		
Telep	phone: ()	
FAX:	:: <u>()</u>	
R	PARTNERSHIP	
51	Du	
	Бу	
		(Firm Name)
		(General Partner's Signature)
Busir	ness address:	
	Telephone: ()	
	FAX: ()	
C	COPPODATION.	
C.		
	Corporation Name:	
	State of Incorporation:	

ву:	1itle	:
(Print Name of Person Au	uthorized to Sign)	
Signature of Authorized Person:		
	(Signature of Authorize	d Person)
If a New Mexico Corporation:		
· —	(NM Certificate of Inco	rnoration Number)
If a Foreign Comparation	(100 Continente of mee	
II a Foreign Corporation:		
	(NM Certificate of Auth	nority Number)
Attest (Secretary):		
Business address		
Telephone: ()		CORPORATE SEAL HER
FAX: ()		
<u> </u>		
or,		
JOINT VENTURE:		
By		
	(Name)	
Address:		
/ www.coo.		

19

Ву	
	(Name)
Address:	
Telephone: ()	
FAX: ()	
By	
	(Name)
Address:	
Telephone: ()	
FAX: ()	

BIDDER MUST FILL IN THE FOLLOWING (if none, write none)

NM License Number: _____ License Classification: _____

Dept. of Workforce Solutions Minimum Wage Act Registration Number (DWS#):

Resident Contractor's Preference Number:

2019-08RFP

APPENDIX F

Sealed Proposals are due: January 4, 2018 by 4:00 pm

Subcontractor Listing

*Signature not required until Award of Contract.

TYPE OF WODV	CITY 2 STATE	Minimum Wage Act Registration #	SIGNATURE *
I YPE OF WORK		(II over \$50,000)	SIGNATUKE *
SITE WORK			
CONCRETE			
FRAMING			
MASONRY			
DRYWALL			
FLOORING			
PAINTING			
HVAC			
PLUMBING			
ELECTRICAL			

SPECIAL SYSTEMS		

RAFT AIA Document A101[™] - 2007

Standard Form of Agreement Between Owner and Contractor where

the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « » (In words, indicate day, month and year.)

BETWEEN the Owner: (Name, legal status, address and other information)

«Village of Taos Ski Valley »« » «7 Firehouse Road » «Taos Ski Valley, NM 87525 » « »

and the Contractor: (Name, legal status, address and other information)

« »« » « » « »

« »

for the following Project: (Name, location and detailed description)

«Village of Taos Ski Valley Administration Building» «1346 NM 150 Taos Ski Valley, NM 87525

The Architect: (Name, legal status, address and other information)

«Living Designs Group Architects »« » «122 A Dona Luz St. » «Taos, NM 87571 » « »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The
author of this document has
added information needed for
its completion. The author
may also have revised the
text of the original AIA
standard form. An Additions
and Deletions Report that
notes added information as
well as revisions to the
standard form text is
available from the author and
should be reviewed.
This document has important
logal concomioncoc

legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™-2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.





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TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- CONTRACT SUM 4
- 5 PAYMENTS
- DISPUTE RESOLUTION 6
- 7 TERMINATION OR SUSPENSION
- MISCELLANEOUS PROVISIONS 8
- 9 ENUMERATION OF CONTRACT DOCUMENTS
- INSURANCE AND BONDS 10

THE CONTRACT DOCUMENTS ARTICLE 1



The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION ARTICLE 3

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner. (Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

« »

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

« »

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

« »

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, subject to adjustments of this Contract Time as provided in the Contract Documents. (Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

« » ARTICLE 4 CONTRACT SUM § 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » (\$ « »), subject to additions and deductions as provided in the Contract Documents. § 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner: (State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.) « » § 4.3 Unit prices, if any: (Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.) Price Per Unit (\$0.00) Item Units and Limitations § 4.4 Allowances included in the Contract Sum, if any: (Identify allowance and state exclusions, if any, from the allowance price.) Item Price ARTICLE 5 PAYMENTS § 5.1 PROGRESS PAYMENTS § 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment. (Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

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3

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of « » percent (« » %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201[™]–2007, General Conditions of the Contract for Construction;
- .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of « » percent (« » %);
- .3 Subtract the aggregate of previous payments made by the Owner; and
- 4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201-2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the .1 full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and (Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial *Completion of Work with consent of surety, if any.*)
- .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201-2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

« »

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

DISPUTE RESOLUTION ARTICLE 6 § 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker. (If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

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« »

« »

« »

« »

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:

(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

- [« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2007
- [« »] Litigation in a court of competent jurisdiction
- [« »] Other (Specify)

« »

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201-2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located. (Insert rate of interest agreed upon, if any.)

« » % « »

§ 8.3 The Owner's representative: (Name, address and other information)

« » « » « »

« »

« »

« »

§ 8.4 The Contractor's representative: (Name, address and other information)

~	»	
~	»	
~	»	
~	»	
~	»	
«	»	_

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§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract: Title Document Date Pages § 9.1.4 The Specifications: (Either list the Specifications here or refer to an exhibit attached to this Agreement.) « » Pages Section Title Date § 9.1.5 The Drawings: (Either list the Drawings here or refer to an exhibit attached to this Agreement.) « » Number Title Date § 9.1.6 The Addenda, if any: Number Date Pages Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9. § 9.1.7 Additional documents, if any, forming part of the Contract Documents: AIA Document E201TM–2007, Digital Data Protocol Exhibit, if completed by the parties, or the .1 following: « » .2 Other documents, if any, listed below: (List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

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ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201-2007.)

Type of insurance or bond	Limit of liability or bond amount (\$0.0	0)
This Agreement entered into as of the day and year	first written above.	
OWNER (Signature)	CONTRACTOR (Signature)	
(Printed name and title)	(Printed name and title)	

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General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address) «Village of Taos Ski Valley Administration Building» «1346 NM 150 Taos Ski Valley, NM 87525»

THE OWNER:

(Name, legal status and address) «Village of Taos Ski Valley »« » «7 Firehouse Road Taos Ski Valley, NM 87525 »

THE ARCHITECT:

(Name, legal status and address) «Living Designs Group Architects »« » «122 A Dona Luz St. Taos, NM 87571 »

TABLE OF ARTICLES

- **GENERAL PROVISIONS** 1
- 2 OWNER
- CONTRACTOR 3
- 4 ARCHITECT
- SUBCONTRACTORS 5
- CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS 6
- CHANGES IN THE WORK 7
- TIMF 8
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- UNCOVERING AND CORRECTION OF WORK 12
- MISCELLANEOUS PROVISIONS 13
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- CLAIMS AND DISPUTES 15

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INDFX (Topics and numbers in **bold** are section headings.) Acceptance of Nonconforming Work 9.6.6, 9.9.3, 12.3 Acceptance of Work 9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3 Access to Work 3.16, 6.2.1, 12.1 Accident Prevention 10 Acts and Omissions 3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5, 10.2.8, 13.4.2, 13.7, 14.1, 15.2 Addenda 1.1.1.3.11 Additional Costs, Claims for 3.7.4, 3.7.5, 6.1.1, 7.3.7.5, 10.3, 15.1.4 **Additional Inspections and Testing** 9.4.2, 9.8.3, 12.2.1, 13.5 Additional Insured 11.1.4 Additional Time, Claims for 3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, 15.1.5 Administration of the Contract 3.1.3, 4.2, 9.4, 9.5 Advertisement or Invitation to Bid 1.1.1 Aesthetic Effect 4.2.13 Allowances 3.8, 7.3.8 All-risk Insurance 11.3.1, 11.3.1.1 **Applications for Payment** 4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5.1, 9.6.3, 9.7, 9.10, 11.1.3 Approvals 2.1.1, 2.2.2, 2.4, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10, 4.2.7, 9.3.2, 13.5.1 Arbitration 8.3.1, 11.3.10, 13.1, 15.3.2, 15.4 ARCHITECT 4 Architect, Definition of 4.1.1 Architect, Extent of Authority 2.4, 3.12.7, 4.1, 4.2, 5.2, 6.3, 7.1.2, 7.3.7, 7.4, 9.2, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.5.1, 13.5.2, 14.2.2, 14.2.4, 15.1.3, 15.2.1 Architect, Limitations of Authority and Responsibility 2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2, 9.5.3, 9.6.4, 15.1.3, 15.2 Architect's Additional Services and Expenses 2.4, 11.3.1.1, 12.2.1, 13.5.2, 13.5.3, 14.2.4 Architect's Administration of the Contract 3.1.3, 4.2, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals 2.4, 3.1.3, 3.5, 3.10.2, 4.2.7 Architect's Authority to Reject Work 3.5, 4.2.6, 12.1.2, 12.2.1 Architect's Copyright 1.1.7, 1.5 Architect's Decisions 3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1, 13.5.2, 15.2, 15.3 Architect's Inspections 3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8 3, 9.9.2, 9.10.1, 13.5 Architect's Instructions 3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.5.2 Architect's Interpretations 4.2.11, 4.2.12 Architect's Project Representative 4.2.10 Architect's Relationship with Contractor 1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.2, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.4.2, 13.5, 15.2 Architect's Relationship with Subcontractors 1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3.7 Architect's Representations 9.4.2, 9.5.1, 9.10.1 Architect's Site Visits 3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5 Asbestos 10.3.1 Attorneys' Fees 3.18.1, 9.10.2, 10.3.3 Award of Separate Contracts 6.1.1, 6.1.2 Award of Subcontracts and Other Contracts for Portions of the Work 5.2 **Basic Definitions** 1.1 **Bidding Requirements** 1.1.1, 5.2.1, 11.4.1 Binding Dispute Resolution 9.7, 11.3.9, 11.3.10, 13.1, 15.2.5, 15.2.6.1, 15.3.1 15.3.2, 15.4.1 **Boiler and Machinery Insurance** 11.3.2 Bonds, Lien 7.3.7.4, 9.10.2, 9.10.3 **Bonds, Performance, and Payment** 7.3.7.4, 9.6.7, 9.10.3, 11.3.9, 11.4 **Building Permit** 3.7.1 Capitalization 1.3 Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Certificates for Payment 4.2.1, 4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.3 Certificates of Inspection, Testing or Approval 13.5.4 Certificates of Insurance 9.10.2, 11.1.3 **Change Orders** 1.1.1, 2.4, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.6, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2, 15.1.3 Change Orders, Definition of 7.2.1 **CHANGES IN THE WORK** 2.2.1, 3.11, 4.2.8, 7, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.3.9 Claims, Definition of 15.1.1 **CLAIMS AND DISPUTES** 3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, 15, 15.4 Claims and Timely Assertion of Claims 15.4.1 **Claims for Additional Cost** 3.2.4, 3.7.4, 6.1.1, 7.3.9, 10.3.2, 15.1.4 **Claims for Additional Time** 3.2.4, 3.7.4, 6.1.1, 8.3.2, 10.3.2, 15.1.5 **Concealed or Unknown Conditions, Claims for** 3.7.4 Claims for Damages 3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6 Claims Subject to Arbitration 15.3.1, 15.4.1 **Cleaning Up 3.15**, 6.3 Commencement of the Work, Conditions Relating to 2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.3.1, 11.3.6, 11.4.1, 15.1.4 Commencement of the Work, Definition of 8.1.2 **Communications Facilitating Contract** Administration 3.9.1, 4.2.4 Completion, Conditions Relating to 3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 13.7, 14.1.2 **COMPLETION, PAYMENTS AND** 9 Completion, Substantial 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7 Compliance with Laws 1.6, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3

Concealed or Unknown Conditions 3.7.4, 4.2.8, 8.3.1, 10.3 Conditions of the Contract 1.1.1, 6.1.1, 6.1.4 Consent, Written 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.3.1, 13.2, 13.4.2, 15.4.4.2 **Consolidation or Joinder** 15.4.4 **CONSTRUCTION BY OWNER OR BY** SEPARATE CONTRACTORS 1.1.4.6 Construction Change Directive, Definition of 7.3.1 **Construction Change Directives** 1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, 7.3, 9.3.1.1 Construction Schedules, Contractor's 3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2 **Contingent Assignment of Subcontracts** 5.4, 14.2.2.2 **Continuing Contract Performance** 15.1.3 Contract, Definition of 1.1.2 CONTRACT, TERMINATION OR SUSPENSION OF THE 5.4.1.1, 11.3.9, 14 **Contract Administration** 3.1.3, 4, 9.4, 9.5 Contract Award and Execution, Conditions Relating to 3.7.1, 3.10, 5.2, 6.1, 11.1.3, 11.3.6, 11.4.1 Contract Documents, Copies Furnished and Use of 1.5.2, 2.2.5, 5.3 Contract Documents, Definition of 1.1.1 **Contract Sum** 3.7.4, 3.8, 5.2.3, 7.2, 7.3, 7.4, 9.1, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.3.1, 14.2.4, 14.3.2, 15.1.4, 15.2.5 Contract Sum, Definition of 9.1 Contract Time 3.7.4, 3.7.5, 3.10.2, 5.2.3, 7.2.1.8, 7.3.1, 7.3.5, 7.4, 8.1.1, 8.2.1, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 14.3.2, 15.1.5.1, 15.2.5 Contract Time, Definition of 8.1.1 CONTRACTOR 3 Contractor, Definition of 3.1, 6.1.2 **Contractor's Construction Schedules 3.10**, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2 Contractor's Employees 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1

Contractor's Liability Insurance 11.1

Contractor's Relationship with Separate Contractors and Owner's Forces 3.12.5, 3.14.2, 4.2.4, 6, 11.3.7, 12.1.2, 12.2.4 Contractor's Relationship with Subcontractors 1.2.2, 3.3.2, 3.18.1, 3.18.2, 5, 9.6.2, 9.6.7, 9.10.2, 11.3.1.2, 11.3.7, 11.3.8 Contractor's Relationship with the Architect 1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.5, 15.1.2, 15.2.1 Contractor's Representations 3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2 Contractor's Responsibility for Those Performing the Work 3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8 Contractor's Review of Contract Documents 3.2 Contractor's Right to Stop the Work 9.7 Contractor's Right to Terminate the Contract 14.1, 15.1.6 Contractor's Submittals 3.10, 3.11, 3.12.4, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3, 11.1.3, 11.4.2 Contractor's Superintendent 3.9, 10.2.6 Contractor's Supervision and Construction Procedures 1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.5, 7.3.7, 8.2, 10, 12, 14, 15.1.3 Contractual Liability Insurance 11.1.1.8, 11.2 Coordination and Correlation 1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1 Copies Furnished of Drawings and Specifications 1.5, 2.2.5, 3.11 Copyrights 1.5, 3.17 Correction of Work 2.3, 2.4, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, 12.2 **Correlation and Intent of the Contract Documents** 1.2 Cost, Definition of 7.3.7 Costs 2.4, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.7, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.3, 12.1.2, 12.2.1, 12.2.4, 13.5, 14 **Cutting and Patching** 3.14, 6.2.5 Damage to Construction of Owner or Separate Contractors 3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 11.1.1, 11.3, 12.2.4

Damage to the Work 3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 11.3.1, 12.2.4 Damages, Claims for 3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6 Damages for Delay 6.1.1, 8.3.3, 9.5.1.6, 9.7, 10.3.2 Date of Commencement of the Work, Definition of 8.1.2 Date of Substantial Completion, Definition of 8.1.3 Day, Definition of 8.1.4 Decisions of the Architect 3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 15.2, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.5.2, 14.2.2, 14.2.4, 15.1, 15.2 **Decisions to Withhold Certification** 9.4.1, 9.5, 9.7, 14.1.1.3 Defective or Nonconforming Work, Acceptance, Rejection and Correction of 2.3, 2.4, 3.5, 4.2.6, 6.2.5, 9.5.1, 9.5.2, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1 Definitions 1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 15.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1 **Delays and Extensions of Time** 3.2, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.5, 15.2.5 Disputes 6.3, 7.3.9, 15.1, 15.2 **Documents and Samples at the Site** 3.11 Drawings, Definition of 1.1.5 Drawings and Specifications, Use and Ownership of 3.11 Effective Date of Insurance 8.2.2, 11.1.2 Emergencies 10.4, 14.1.1.2, 15.1.4 Employees, Contractor's 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1 Equipment, Labor, Materials or 1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2 Execution and Progress of the Work 1.1.3, 1.2.1, 1.2.2, 2.2.3, 2.2.5, 3.1, 3.3.1, 3.4.1, 3.5, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2, 7.1.3, 7.3.5, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.2, 14.2, 14.3.1, 15.1.3 Extensions of Time 3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.5, 15.2.5 Failure of Payment 9.5.1.3, 9.7, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2

Faulty Work (See Defective or Nonconforming Work) **Final Completion and Final Payment** 4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.3.1, 11.3.5, 12.3, 14.2.4, 14.4.3 Financial Arrangements, Owner's 2.2.1, 13.2.2, 14.1.1.4 Fire and Extended Coverage Insurance 11.3.1.1 **GENERAL PROVISIONS** 1 **Governing Law** 13.1 Guarantees (See Warranty) **Hazardous Materials** 10.2.4, 10.3 Identification of Subcontractors and Suppliers 5.2.1Indemnification 3.17, 3.18, 9.10.2, 10.3.3, 10.3.5, 10.3.6, 11.3.1.2, 11.3.7 Information and Services Required of the Owner 2.1.2, 2.2, 3.2.2, 3.12.4, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.4, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3 **Initial Decision** 15.2 Initial Decision Maker, Definition of 1.1.8 Initial Decision Maker, Decisions 14.2.2, 14.2.4, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5 Initial Decision Maker, Extent of Authority 14.2.2, 14.2.4, 15.1.3, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5 Injury or Damage to Person or Property 10.2.8, 10.4 Inspections 3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.5 Instructions to Bidders 1.1.1 Instructions to the Contractor 3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.5.2 Instruments of Service, Definition of 1.1.7 Insurance 3.18.1, 6.1.1, 7.3.7, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 11 **Insurance, Boiler and Machinery** 11.3.2 **Insurance, Contractor's Liability** 111 Insurance, Effective Date of 8.2.2, 11.1.2 Insurance, Loss of Use 11.3.3 **Insurance, Owner's Liability** 11.2

Insurance, **Property** 10.2.5. 11.3 Insurance, Stored Materials 932 **INSURANCE AND BONDS** 11 Insurance Companies, Consent to Partial Occupancy 9.9.1 Intent of the Contract Documents 1.2.1, 4.2.7, 4.2.12, 4.2.13, 7.4 Interest 13.6 Interpretation 1.2.3, 1.4, 4.1.1, 5.1, 6.1.2, 15.1.1 Interpretations, Written 4.2.11, 4.2.12, 15.1.4 Judgment on Final Award 15.4.2 Labor and Materials, Equipment 1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3, 7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2 Labor Disputes 8.3.1 Laws and Regulations 1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4 Liens 2.1.2, 9.3.3, 9.10.2, 9.10.4, 15.2.8 Limitations, Statutes of 12.2.5, 13.7, 15.4.1.1 Limitations of Liability 2.3, 3.2.2, 3.5, 3.12.10, 3.17, 3.18.1, 4.2.6, 4.2.7, 4.2.12, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 10.2.5, 10.3.3, 11.1.2, 11.2, 11.3.7, 12.2.5, 13.4.2 Limitations of Time 2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3, 1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 11.3.1.5, 11.3.6, 11.3.10, 12.2, 13.5, 13.7, 14, 15 Loss of Use Insurance 11.3.3 Material Suppliers 1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.6, 9.10.5 Materials, Hazardous 10.2.4.10.3 Materials, Labor, Equipment and 1.1.3, 1.1.6, 1.5.1, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2 Means, Methods, Techniques, Sequences and Procedures of Construction 3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2 Mechanic's Lien 2.1.2, 15.2.8

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5

Mediation 8.3.1, 10.3.5, 10.3.6, 15.2.1, 15.2.5, 15.2.6, 15.3, 15.4.1 **Minor Changes in the Work** 1.1.1, 3.12.8, 4.2.8, 7.1, 7.4 **MISCELLANEOUS PROVISIONS** 13 Modifications, Definition of 1.1.1 Modifications to the Contract 1.1.1, 1.1.2, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2, 11.3.1 **Mutual Responsibility** 6.2 Nonconforming Work, Acceptance of 9.6.6, 9.9.3, 12.3 Nonconforming Work, Rejection and Correction of 2.3, 2.4, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2.1 Notice 2.2.1, 2.3, 2.4, 3.2.4, 3.3.1, 3.7.2, 3.12.9, 5.2.1, 9.7, 9.10, 10.2.2, 11.1.3, 12.2.2.1, 13.3, 13.5.1, 13.5.2, 14.1, 14.2, 15.2.8, 15.4.1 Notice, Written 2.3, 2.4, 3.3.1, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 11.3.6, 12.2.2.1, 13.3, 14, 15.2.8, 15.4.1 Notice of Claims 3.7.4, 10.2.8, 15.1.2, 15.4 Notice of Testing and Inspections 13.5.1, 13.5.2 Observations, Contractor's 3.2, 3.7.4 Occupancy 2.2.2, 9.6.6, 9.8, 11.3.1.5 Orders, Written 1.1.1, 2.3, 3.9.2, 7, 8.2.2, 11.3.9, 12.1, 12.2.2.1, 13.5.2, 14.3.1 **OWNER** 2 Owner, Definition of 2.1.1 **Owner, Information and Services Required of the** 2.1.2, 2.2, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.3, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3 **Owner's** Authority 1.5, 2.1.1, 2.3, 2.4, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.1.3, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.1.3, 11.3.3, 11.3.10, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7 **Owner's Financial Capability** 2.2.1, 13.2.2, 14.1.1.4 **Owner's Liability Insurance** 11.2 Owner's Relationship with Subcontractors 1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

User Notes:

6.3 **Owner's Right to Perform Construction and to Award Separate Contracts** 6.1 **Owner's Right to Stop the Work** 2.3 Owner's Right to Suspend the Work 14.3 Owner's Right to Terminate the Contract 14.2 **Ownership and Use of Drawings, Specifications** and Other Instruments of Service 1.1.1, 1.1.6, 1.1.7, **1.5**, 2.2.5, 3.2.2, 3.11, 3.17, 4.2.12, 5.3 **Partial Occupancy or Use** 9.6.6, 9.9, 11.3.1.5 Patching, Cutting and 3.14, 6.2.5 Patents 3.17 Payment, Applications for 4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3 **Payment, Certificates for** 4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 13.7, 14.1.1.3, 14.2.4 Payment, Failure of 9.5.1.3, 9.7, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2 Payment, Final 4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.4.1, 12.3, 13.7, 14.2.4, 14.4.3 Payment Bond, Performance Bond and 7.3.7.4, 9.6.7, 9.10.3, 11.4 **Payments**, **Progress** 9.3, 9.6, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3 PAYMENTS AND COMPLETION 9 Payments to Subcontractors 5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2 PCB 10.3.1 **Performance Bond and Payment Bond** 7.3.7.4, 9.6.7, 9.10.3, 11.4 Permits, Fees, Notices and Compliance with Laws 2.2.2, 3.7, 3.13, 7.3.7.4, 10.2.2 PERSONS AND PROPERTY, PROTECTION OF 10 Polychlorinated Biphenyl 10.3.1 Product Data, Definition of 3.12.2 **Product Data and Samples, Shop Drawings** 3.11, 3.12, 4.2.7 **Progress and Completion** 4.2.2, 8.2, 9.8, 9.9.1, 14.1.4, 15.1.3 AIA Document A201 - 2007. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997 and 2007 by The American Institute of Architects. All rights reserved. WARNING: This AIA[®] Document is protected by U.S. Copyright Law and International Treaties. Unauthorized reproduction or distribution of this AIA[®] Document, or any portion of it, may result in severe civil and criminal penalties, and 6 will be prosecuted to the maximum extent possible under the law. This draft was produced by AIA software at 15:47:48 on 05/14/2018 under Order No.6501719583 which expires on 04/20/2019, and is not for resale.

Owner's Right to Carry Out the Work

Owner's Right to Clean Up

2.4. 14.2.2

Progress Payments 9.3, 9.6, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3 **Project**. Definition of 1.1.4 **Project Representatives** 4.2.10 **Property Insurance** 10.2.5. 11.3 PROTECTION OF PERSONS AND PROPERTY 10 Regulations and Laws 1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1, 11.4, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4 Rejection of Work 3.5, 4.2.6, 12.2.1 Releases and Waivers of Liens 9.10.2 Representations 3.2.1, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.8.2, 9.10.1 Representatives 2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.2, 4.2.10, 5.1.1, 5.1.2, 13.2.1 Responsibility for Those Performing the Work 3.3.2, 3.18, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10 Retainage 9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3 **Review of Contract Documents and Field Conditions by Contractor 3.2**, 3.12.7, 6.1.3 Review of Contractor's Submittals by Owner and Architect 3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2 Review of Shop Drawings, Product Data and Samples by Contractor 3.12 **Rights and Remedies** 1.1.2, 2.3, 2.4, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, 13.4, 14, 15.4 **Royalties, Patents and Copyrights** 3.17 Rules and Notices for Arbitration 15.4.1 Safety of Persons and Property **10.2**, 10.4 **Safety Precautions and Programs** 3.3.1, 4.2.2, 4.2.7, 5.3, **10.1**, 10.2, 10.4 Samples, Definition of 3.12.3 Samples, Shop Drawings, Product Data and 3.11, 3.12, 4.2.7 Samples at the Site, Documents and 3.11 **Schedule of Values** 9.2. 9.3.1

Schedules, Construction 3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2 Separate Contracts and Contractors 1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2 Shop Drawings, Definition of 3.12.1 Shop Drawings, Product Data and Samples 3.11, 3.12, 4.2.7 Site, Use of 3.13, 6.1.1, 6.2.1 Site Inspections 3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.4.2, 9.10.1, 13.5 Site Visits, Architect's 3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5, 1, 9, 9.2, 9.10.1, 13.5 Special Inspections and Testing 4.2.6, 12.2.1, 13.5 Specifications, Definition of 1.1.6 Specifications 1.1.1, 1.1.6, 1.2.2, 1.5, 3.11, 3.12.10, 3.17, 4.2.14 Statute of Limitations 13.7, 15.4.1.1 Stopping the Work 2.3, 9.7, 10.3, 14.1 Stored Materials 6.2.1, 9.3.2, 10.2.1.2, 10.2.4 Subcontractor, Definition of 5.1.1 **SUBCONTRACTORS** 5 Subcontractors, Work by 1.2.2, 3.3.2, 3.12.1, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7 **Subcontractual Relations** 5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1 **Submittals** 3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.7, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3, 11.1.3 Submittal Schedule 3.10.2, 3.12.5, 4.2.7 Subrogation, Waivers of 6.1.1, 11.3.7 **Substantial Completion** 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2, 13.7 Substantial Completion, Definition of 9.8.1 Substitution of Subcontractors 5.2.3. 5.2.4 Substitution of Architect 413 Substitutions of Materials 3.4.2, 3.5, 7.3.8 Sub-subcontractor, Definition of 5.1.2 Subsurface Conditions 3.7.4 **Successors and Assigns** 13.2

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7

Superintendent **3.9**, 10.2.6 **Supervision and Construction Procedures** 1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.7, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.3 Suretv 5.4.1.2, 9.8.5, 9.10.2, 9.10.3, 14.2.2, 15.2.7 Surety, Consent of 9.10.2, 9.10.3 Surveys 2.2.3 Suspension by the Owner for Convenience 14.3 Suspension of the Work 5.4.2. 14.3 Suspension or Termination of the Contract 5.4.1.1.14 Taxes 3.6, 3.8.2.1, 7.3.7.4 **Termination by the Contractor** 14.1, 15.1.6 Termination by the Owner for Cause 5.4.1.1, 14.2, 15.1.6 Termination by the Owner for Convenience 14.4 Termination of the Architect 4.1.3 Termination of the Contractor 14.2.2 **TERMINATION OR SUSPENSION OF THE** CONTRACT 14 **Tests and Inspections** 3.1.3, 3.3.3, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 11.4.1, 12.2.1, 13.5 TIME 8 Time, Delays and Extensions of 3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.5, 15.2.5 Time Limits 2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 12.2, 13.5, 13.7, 14, 15.1.2, 15.4 **Time Limits on Claims** 3.7.4, 10.2.8, 13.7, 15.1.2

Title to Work 9.3.2, 9.3.3 **Transmission of Data in Digital Form** 1.6 UNCOVERING AND CORRECTION OF WORK 12 **Uncovering of Work** 12.1 Unforeseen Conditions, Concealed or Unknown 3.7.4, 8.3.1, 10.3 Unit Prices 7.3.3.2. 7.3.4 Use of Documents 1.1.1, 1.5, 2.2.5, 3.12.6, 5.3 Use of Site 3.13, 6.1.1, 6.2.1 Values. Schedule of 9.2, 9.3.1 Waiver of Claims by the Architect 13.4.2 Waiver of Claims by the Contractor 9.10.5, 13.4.2, 15.1.6 Waiver of Claims by the Owner 9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.4.2, 14.2.4, 15.1.6 Waiver of Consequential Damages 14.2.4. 15.1.6 Waiver of Liens 9.10.2, 9.10.4 Waivers of Subrogation 6.1.1, 11.3.7 Warranty 3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.4, 12.2.2, 13.7 Weather Delays 15.1.5.2 Work. Definition of 1.1.3 Written Consent 1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5 9.9.1, 9.10.2, 9.10.3, 11.4.1, 13.2, 13.4.2, 15.4.4.2 Written Interpretations 4.2.11, 4.2.12 Written Notice 2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 8.2.2, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 12.2.2, 12.2.4, 13.3, 14, 15.4.1 Written Orders 1.1.1, 2.3, 3.9, 7, 8.2.2, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

8

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ARTICLE 1 GENERAL PROVISIONS § 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall. continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

- § 3.8.2 Unless otherwise provided in the Contract Documents,
 - .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
 - .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
 - .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

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§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

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ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and

completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contract to that the Contractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS § 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those

portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- The change in the Work; .1
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to .1 permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

- Costs of labor, including social security, old age and unemployment insurance, fringe benefits required .1 by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others:

- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work: and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

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§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of

the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- defective Work not remedied; .1
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner-

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the

Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY § 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to

persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- Claims for damages insured by usual personal injury liability coverage; .4
- Claims for damages, other than to the Work itself, because of injury to or destruction of tangible .5 property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement

of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise

have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established

under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

TERMINATION OR SUSPENSION OF THE CONTRACT ARTICLE 14

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other

persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be .1 stopped;
- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable .4 evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- repeatedly refuses or fails to supply enough properly skilled workers or proper materials; .1
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request .3 of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

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§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, .1 business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

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§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.





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DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01_1000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Phased Construction.
 - 4. Work by Owner.
 - 5. Work under separate contracts.
 - 6. Future work.
 - 7. Purchase contracts.
 - 8. Owner-furnished products.
 - 9. Contractor-furnished, Owner-installed products.
 - 10. Access to site.
 - 11. Coordination with occupants.
 - 12. Work restrictions.
 - 13. Specification and drawing conventions.
 - 14. Miscellaneous provisions.
- B. Related Requirements:
 - 1. Section 01_5000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Village of Taos Ski Valley-Administration Building
 - 1. Project Location: 1346 NM 150 Village of Taos Ski Valley, NM 87525

B. Owner: Village of Taos Ski Valley

1)

- 1. Owner's Representative: Mr. Richard Wilson, Village Building Inspector
 - 1) Phone: 575-776-8220 office
 - 2) Email: rich@vtsv.org
- C. Architect: Living Designs Group Architects, Dona Luz Street, Taos, NM 87571
 - Principal in Charge: Douglas J. Patterson, AIA
 - a) Email: dpatterson@ldg-arch.com
 - 2) Project Manager: Jason Boyd
 - a) Email: jboyd@ldg-arch.com

- b) Phone: 575-751-9481
- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
 - 1. Structural Engineer: High Desert Structural Engineering, Inc., 1911 5th Street Suite 205, Santa Fe, NM 87505
 - 1) Contact: Bob Wickman, PE
 - a) Email: highdeserse@gmail.com
 - b) Phone: 505-780-8897
 - 2. Mechanical Engineer: Tipton Engineering Group LLC, 4700 Lincoln Rd. NE, Albuquerque, NM 87109
 - 1) Contact: Karl Tipton, PE
 - a) Email: karlt@tiptonengineering.co
 - b) Phone: 505-761-3100
 - 3. Electrical Engineer: Tipton Engineering Group LLC, 4700 Lincoln Rd. NE, Albuquerque, NM 87109
 - 1) Contact: Karl Tipton, PE
 - a) Email: karlt@tiptonengineering.co
 - b) Phone: 505-310-3978
- E. Other Owner Consultants: The Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:
 - 1. Civil Engineer: Anchor Engineering LLC., 1035 S. Bosque Lp., Bosque Farms, NM 87068
 - 1) Contact: Martin Garcia, PE
 - a) Email: martin@anchoreng.net
 - b) Phone: 505-362-1530

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and consists of the following:
 - 1. Renovation and addition to existing two story wood frame building, Change of Occupancy Group, Mixed Use "A-3" Assembly and "B" Business, Type VB construction. Major building assemblies include but are not limited to the following: earthwork, concrete footings and stemwalls, concrete slabs, structural steel, wood framing, gypsum wall board, Metal roofing, storefront and wood clad windows, hollow metal doors & frames, sheet flooring, ceramic tile, paint, carpet, and electrical and mechanical systems upgrades.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.5 PHASED CONSTRUCTION

A. The Work shall be conducted in a single phase:

- 1. Work shall include but not limited to earthwork, concrete footings and stemwalls, concrete slabe, structural steel, wood framing, gypsum wall board, metal roofing, storefront and wood clad window assemblies, hollow metal doors & frames, sheet flooring, ceramic tile, paint, carpet, and electrical and mechanical systems. Work of this phase shall allow the Owner to fully use the facility upon substantial completion. Work of this phase shall allow the Owner to fully use the facility upon substantial completion. Work of this phase shall allow the Owner to fully use the facility upon substantial completion. Work of this phase shall commence 10 days after the Notice to Proceed. Substantial completion date to be determined.
- B. Before commencing Work of each phase, submit an updated copy of Contractor's construction schedule showing the sequence, commencement and completion dates for all phases of the Work.

1.6 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.7 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Concurrent Work: Owner will award separate contracts for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
 - 1. Civil/Site :
- C. Subsequent Work: Owner will award separate contracts for the following additional work to be performed at site following Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
 - 1. Furniture, Fixtures, & Equipment: for procurement, delivery, and installation of free standing FFE unless noted otherwise in the Contract Documents.
 - 2. Phone & Cable Television: for procurement, and installation of a fully functional telephone and cable television system.

1.8 OWNER-FURNISHED & CONTRACTOR INSTALLED PRODUCTS

- A. Owner will furnish products indicated NIC (Not in Contract). The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections.
- B. Owner-Furnished & Contractor Installed Products:
 - 1. Furnishings
 - 2. Small Equipment

1.9 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to areas indicated on the drawings.
 - 2. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.10 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner intends to occupy the Project upon Substantial Completion. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.

1.11 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

- 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
- 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations and scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

SECTION 01_2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 01_6000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A sample attached at end of section.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
- e. Samples, where applicable or requested.
- f. Certificates and qualification data, where applicable or requested.
- g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
- h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
- i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
- j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
- k. Cost information, including a proposal of change, if any, in the Contract Sum.
- 1. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
- m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution provides sustainable design characteristics that specified product provided.
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's construction schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution has been coordinated with other portions of the Work.
 - j. Requested substitution provides specified warranty.
 - k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01_2500

T	Knowledge for Creating and Sustaining the Built Environment
Y	Knowledge for Creating and Sustaining the Built Environment

SUBSTITUTION REQUEST

(After the Bidding/Negotiating Stage)

Project:	Substitution Request Number:
	From:
То:	Date:
	A/E Project Number:
Re:	Contract For:
Specification Title:	Description:
Section: Page:	Article/Paragraph:
Proposed Substitution:	
Manufacturer: Address:	Phone:
Trade Name:	Model No.:
Installer: Address:	Phone:
History: \Box New product \Box 1-4 years old \Box 5-10 year	s old 🗆 More than 10 years old
Differences between proposed substitution and specified	product:
Point-by-point comparative data attached — REQUIR	ED BY A/E
Reason for not providing specified item:	
Similar Installation:	
Project:	Architect:
Address:	Owner:
	Date Installed:
Proposed substitution affects other parts of Work:	No 🗆 Yes; explain
Savings to Owner for accepting substitution:	(\$).
Proposed substitution changes Contract Time: \Box No	\Box Yes [Add] [Deduct] days.
Supporting Data Attached: Drawings Product	Data 🗆 Samples 🗆 Tests 🗆 Reports 🗆

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by:		** ***								
Signed by:		·····								
Firm:										
Address:										
Telephone:										
Attachments:										
			<u>N</u> V —							
A/E's REVIEW AND ACTION Substitution approved - Make subm Substitution approved as noted - Ma Substitution rejected - Use specified Substitution Request received too la Signed by:	ittals in accordance ake submittals in acc materials. te - Use specified m	with Specificates cordance with states	tion Section 01 25 0 Specification Section	0 Substitu n 01 25 00	tion Procedures. Substitution Procedures.					
Additional Comments: Contractor		□ Supplier	□ Manufacturer	□ A/E	□					
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			1111 b							

SECTION 01_2600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 01_2500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 20 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- e. Quotation Form: Use CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail or contractor provided forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 - 7. Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail or contractor provided form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01_2600

SECTION 01_2900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 01_2600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.

- 2. Arrange schedule of values consistent with format of AIA Document G703.
- 3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Change Orders (numbers) that affect value.
 - d. Dollar value of the following, as a percentage of the Contract Sum to nearest onehundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
- 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
- 6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- 7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-inplace may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
- 8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Submit Application for Payment to Architect by the last day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
 - 1. Submit draft copy of Application for Payment five days prior to due date for review by Architect.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

- 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
- 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
- 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit conditional final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Schedule of values.
 - 3. Contractor's construction schedule (preliminary if not final).
 - 4. Copies of building permits.
 - 5. Certificates of insurance and insurance policies.
 - 6. Performance and payment bonds.
 - 7. Data needed to acquire Owner's insurance.

- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 - 1. Evidence of completion of Project closeout requirements.
 - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - 3. Updated final statement, accounting for final changes to the Contract Sum.
 - 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 - 6. AIA Document G707, "Consent of Surety to Final Payment."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01_2900

SECTION 01_3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 01_7300 "Execution" for procedures for coordinating general installation and fieldengineering services, including establishment of benchmarks and control points.
 - 2. Section 01 7700 "Closeout Procedures" for coordinating closeout of the Contract.
 - 3. Section 01_9113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
 - 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 - 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 - 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 - 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 - 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 - 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.

- b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
- c. Fire-rated enclosures around ductwork.
- 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
- 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
- 9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
- 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01_3300 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Architect.
 - 6. RFI number, numbered sequentially.
 - 7. RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Field dimensions and conditions, as appropriate.
 - 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 12. Contractor's signature.
 - 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

- a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716 or software-generated form with substantially the same content as indicated above, acceptable to Architect.
 - 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 - 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01_2600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. On receipt of Architect's action immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
 - 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

- 1. Conduct the conference to review responsibilities and personnel assignments.
- 2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
- 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - 1. Sustainable design requirements.
 - m. Preparation of record documents.
 - n. Use of the premises.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
- 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 - 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Owner's Commissioning Authority of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.

- j. Possible conflicts.
- k. Compatibility requirements.
- l. Time schedules.
- m. Weather limitations.
- n. Manufacturer's written instructions.
- o. Warranty requirements.
- p. Compatibility of materials.
- q. Acceptability of substrates.
- r. Temporary facilities and controls.
- s. Space and access limitations.
- t. Regulations of authorities having jurisdiction.
- u. Testing and inspecting requirements.
- v. Installation procedures.
- w. Coordination with other work.
- x. Required performance results.
- y. Protection of adjacent work.
- z. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
- 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
- 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.
 - 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - 2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for completing sustainable design documentation.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for delivery of material samples, attic stock, and spare parts.
 - g. Requirements for demonstration and training.
 - h. Preparation of Contractor's punch list.
 - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - j. Submittal procedures.
 - k. Coordination of separate contracts.
 - 1. Owner's partial occupancy requirements.
 - m. Installation of Owner's furniture, fixtures, and equipment.
 - n. Responsibility for removing temporary facilities and controls.
 - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

- E. Progress Meetings: Conduct progress meetings at biweekly intervals.
 - 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Status of sustainable design documentation.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of proposal requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
 - 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

- 1. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
- 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
- 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01_3100

SECTION 01_3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 01_2900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 01_7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 3. Section 01_7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 4. Section 01_7900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

- 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
- 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
- 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
- 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of a limited number of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 - 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in Autocad .dwg format.
 - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.
 - d. The following digital data files will by furnished for each appropriate discipline:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.
 - 3) Roof Plan.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

- 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 - 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - 1. Other necessary identification.
 - 4. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
 - a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Architect.
 - 6) Name of Contractor.
 - 7) Name of firm or entity that prepared submittal.
 - 8) Names of subcontractor, manufacturer, and supplier.
 - 9) Category and type of submittal.
 - 10) Submittal purpose and description.

- 11) Specification Section number and title.
- 12) Specification paragraph number or drawing designation and generic name for each of multiple items.
- 13) Drawing number and detail references, as appropriate.
- 14) Indication of full or partial submittal.
- 15) Transmittal number, numbered consecutively.
- 16) Submittal and transmittal distribution record.
- 17) Remarks.
- 18) Signature of transmitter.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Action Submittals: Submit five paper copies of each submittal unless otherwise indicated. Architect will return two copies.
 - 2. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
 - 3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.

- 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
- 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
- 5. Submit Product Data before or concurrent with Samples.
- 6. Submit Product Data in the following format:
 - a. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 - 2. Submit Shop Drawings in the following format:
 - a. Five opaque copies of each submittal. Architect will retain two copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.

- 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
- 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
 - 5. Submit product schedule in the following format:
 - a. Three paper copies of product schedule or list unless otherwise indicated. Architect will return two copies.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01_3100 "Project Management and Coordination."
- G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01_2900 "Payment Procedures."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01_4000 "Quality Requirements."

- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01_7700 "Closeout Procedures."
- J. Maintenance Data: Comply with requirements specified in Section 01_7823 "Operation and Maintenance Data."
- K. Sustainable Design Submittals: Comply with requirements specified in Section 01_8113 "Sustainable Design Requirements."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01_7700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01_3300

SECTION 01_4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.

- 5. Identification of test and inspection methods.
- 6. Number of tests and inspections required.
- 7. Time schedule or time span for tests and inspections.
- 8. Requirements for obtaining samples.
- 9. Unique characteristics of each quality-control service.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- C. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.
- D. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- E. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 **REPORTS AND DOCUMENTS**

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.

- 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
- 12. Name and signature of laboratory inspector.
- 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement that equipment complies with requirements.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 4. Statement whether conditions, products, and installation will affect warranty.
 - 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind

indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar qualitycontrol services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 - 1. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01_7300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01_4000

SECTION 01_5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 01 1000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1.5 QUALITY ASSURANCE

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

C. Accessible Temporary Egress: Comply with applicable provisions in ICC/ANSI A117.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
 - 3. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg.
 - 4. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

- 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
- 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Connect temporary service to Owner's existing power source, as directed by Owner.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- G. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.
 - 1. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.

- b. Ambulance service.
- c. Contractor's home office.
- d. Contractor's emergency after-hours telephone number.
- e. Architect's office.
- f. Engineers' offices.
- g. Owner's office.
- h. Principal subcontractors' field and home offices.
- 2. Provide superintendent with cellular telephone or portable use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Provide temporary parking areas for construction personnel.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- F. Waste Disposal Facilities: Comply with requirements specified in Section 01_7419 "Construction Waste Management and Disposal."
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01_7300 "Execution."
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Temporary Elevator Use: See Section 14_2400 "Hydraulic Elevators for temporary use of new elevators.
- J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 01_1000 "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to authorities having jurisdiction.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Site Enclosure Fence: Before construction operations begin furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

- 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard, replace, or clean stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use permanent HVAC system to control humidity.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.6 **OPERATION, TERMINATION, AND REMOVAL**

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01_7700 "Closeout Procedures."

END OF SECTION 01_5000

SECTION 01_6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 01_2500 "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify

Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Section 01_3300 "Submittal Procedures."
- b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01_3300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 **PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 **PRODUCT SELECTION PROCEDURES**

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 - 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
 - 1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - 3. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a

comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.

C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01_6000

PRODUCT SUBSTITUTION REQUEST FORM

The undersigned, qualified bidder, subcontractor, manufacturer, or supplier requests that the following product be accepted for use in the Project

PRODUCT:		
MODEL NO.:		
MANUFACTURER:		
ADDRESS:		
The above product would be used in lieu of		
PRODUCT:		
specified in		
SECTION:		
PARAGRAPH:		

Attached are the following circled items:

- 1. Product description including specifications, performance and test data, and applicable reference standards.
- 2. Drawings.
- 3. Photographs.
- 4. Samples.
- 5. Tabulated comparison with specified product.
- 6. For items requiring color selections, full range of manufacturer's color samples.
- 7. Other:

(CONTINUED NEXT PAGE)

The undersigned certifies that the following statements are correct. Explanations for all items which are <u>not</u> true are attached.

1.	Proposed substitution has been thoroughly investigated and function, appearance, and quality meet or exceed that of specified product.	TRUE FALSE
2.	Same warranty will be provided for substitution as for specified product.	TRUE FALSE
3.	No aspect of Project will require re-design.	TRUE FALSE
4.	Use of substitution will <u>not</u> adversely affect:	
	a. Dimensions shown on Drawings.	TRUE FALSE
	b. Construction schedule and date of completion.	TRUE FALSE
	c. Work of other trades.	TRUE FALSE
5.	Maintenance service and replacement parts for proposed substitution will be readily available in [Las Cruces] [El Paso] [Roswell] [Albuquerque] [Southern New Mexico]	
	[Northern New Mexico] [] area.	TRUE FALSE
6.	Proposed substitution does <u>not</u> contain asbestos in any form.	TRUE FALSE

Submitted By:

COMPANY:	_
ADDRESS:	
TELEPHONE NUMBER:	
NAME OF PERSON SUBMITTING REQUEST:	
TITLE:	
DATE:	

END OF SECTION 01_6310

SECTION 01_7300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Requirements:
 - 1. Section 01_1000 "Summary" for limits on use of Project site.
 - 2. Section 01_3300 "Submittal Procedures" for submitting surveys.
 - 3. Section 07_8413 "Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 4. Dates: Indicate when cutting and patching will be performed.

- 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Electrical wiring systems.
 - j. Operating systems of special construction.
 - 3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

- 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in Section 01_8113.13 "Sustainable Design Requirements".
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01_3100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01_1000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

- a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
- b. Restore damaged pipe covering to its original condition.
- 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
- 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01_7419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01_9113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01_4000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01_7300

SECTION 01_7500 - STARTING AND ADJUSTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: General procedures for starting, monitoring, and adjusting items of equipment and complete systems.
- B. Related sections:
 - 1. Section 01 7800 Closeout Submittals: Operation and maintenance manuals.
 - 2. Section 23 0593- Testing, Adjusting, and Balancing: Balancing of HVAC system.

PART 2- PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 SCHEDULING

- A. Coordinate schedule for starting of systems and equipment to ensure proper sequencing.
- B. Notify Architect 7 days prior to startup of each system.

3.2 PREPARATION

- A. Prior to startup, inspect items of equipment and systems to ensure that:
 - 1. Installation is in accordance with manufacturer's instructions.
 - 2. No defective items have been installed and there are no loose connections.
 - 3. Power supplies are correct voltage, phasing, and frequency.
 - 4. Grounding and transient protection systems are properly installed.
 - 5. Items have been properly lubricated, belts tensioned, and control sequence and other conditions which may cause damage have been addressed.
- B. Verify that system wiring has been tested.
- C. Verify that provisions have been made for safety of personnel.

3.3 STARTING OF SYSTEMS

A. Execute starting under supervision of responsible personnel in accordance with manufacturer's instructions.

- B. When specified in individual sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment and system installation prior to startup and to supervise placing equipment and system in operation.
- C. Adjustment: Monitor systems and verify performance. Correct deficiencies. Replace defective components and equipment. Adjust equipment and systems for smooth and proper installation.
- D. Submit written report in accordance with Section 01 3300 Submittal Procedures that equipment and systems have been properly installed and are functioning correctly.

END OF SECTION 01_7500

SECTION 01_7700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 01_7300 "Execution" for progress cleaning of Project site.
 - 2. Section 01_7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Section 01_7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 4. Section 01_7900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of **10** days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section.
 - 5. Submit test/adjust/balance records.
 - 6. Submit sustainable design submittals required in Section 01_8113.13 "Sustainable Design Requirements" and in individual Sections.
 - 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01_7900 "Demonstration and Training."
 - 6. Advise Owner of changeover in heat and other utilities.
 - 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 9. Complete final cleaning requirements, including touchup painting.
 - 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor

of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

- 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- 2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
 - 1. Submit a final Application for Payment according to Section 01-2900 "Payment Procedures."
 - 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 - 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first proceeding from lowest floor to highest floor.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
- f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- h. Sweep concrete floors broom clean in unoccupied spaces.
- i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
- j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
- k. Remove labels that are not permanent.
- 1. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
- p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
- q. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in "Section 01_7419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01_7700

SECTION 01_7800 - CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes procedures for preparing and submitting closeout submittals:
 - 1. Project Record Documents.
 - 2. Operation and maintenance manuals and data.
 - 3. Warranties.
 - 4. Insurance information.
 - 5. Certificates of inspection and compliance.
 - 6. Maintenance tools.
 - 7. Extra materials.
 - 8. Keys.
- B. Related documents and sections:
 - 1. Document 007000 General Conditions of the Contract:
 - a. Article 3.5: Contractor's warranty that Work is of good quality and free from defects and conforms to Contract Documents.
 - b. Article 9.9.1: Commencement of warranties and correction period.
 - c. Article 9.10.1: Closeout requirements
 - d. Article 9.11: Affidavits and Certificates required before Final Payment
 - e. Article 12.2.2.1: One year correction period for Contractor to correct defective work.
 - 2. Section 012900 Price and Payment Procedures: Submittal of Applications of Payment.
 - 3. Section 012100 Allowances: Cash allowances for production of Record Drawings.
 - 3. Section 013300 Submittal Procedures: Submittal of shop drawings, product data, samples, installation instruction, reports and other submittals during construction prior to closeout.
 - 4. Section 017500 Starting, Adjusting, and Demonstrating: Use of operation and maintenance manuals for demonstration and training sessions.

1.2 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to work:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed submittals.
- B. Store Record Documents separate from documents used for construction. Label "Project Record Documents".
- C. Record information concurrent with construction progress. Use erasable colored pencil. Date all entries. Call attention to entry by circling area affected.
- D. Specifications: Legibly mark and record in each section description of actual products installed, including the following:

- 1. Manufacturer's name and product model and number.
- 2. Product substitutions or alternates utilized.
- 3. Changes made by Addenda and modifications.
- E. Contract Drawings and shop drawings: Legibly mark each item to record actual construction including:
 - 1. Actual items of equipment and system components installed.
 - 2. Actual locations of components and routing of piping and raceways.
 - 3. Measured horizontal and vertical locations of underground water, sewer, irrigation, electrical, and other utilities and appurtenances, referenced to permanent surface improvements.
 - 4. Measured locations of piping, raceways, and other items concealed in construction, referenced to visible and accessible features.
 - 5. Field changes of dimension and detail.
 - 6. Details not on original Contract Drawings.
- F. Documents will be reviewed by Architect at each submittal of Application for Payment to ensure that entries are current.
- G. Submit documents to Architect prior to or in conjunction with submission of Contractor's request for Substantial Completion and in accordance with Owner's procedures.

1.3 OPERATION AND MAINTENANCE DATA

- A. Provide operation and maintenance data for:
 - 1. Mechanical equipment, systems, and controls specified in Division 23 Mechanical.
 - 2. Electrical equipment, systems, and controls specified in Division 26 Electrical.
 - 3. Other equipment and systems for which operation and maintenance data is requested in individual specification sections.
- B. Submission:
 - 1. Submit data to Architect in one or more binders.
 - 2. Submit for review one draft copy 30 days prior to need date or as otherwise specified. This copy will be returned after review with Architect's comments. Revise content as required.
 - 3. Once approved, submit 3 copies of final operation and maintenance manuals. All manuals shall be submitted prior to or in conjunction with Contractor's request for Substantial Completion and prior to demonstration and training session.
- C. Contents:
 - 1. Appropriate design criteria.
 - 2. Equipment and parts lists.
 - 3. Operating instructions.
 - 4. Maintenance instruction for equipment and finishes.
 - 5. Shop drawings and product data.
 - 6. Testing, balancing, and other field quality reports.
 - 7. Copies of warranties.
 - 8. Directory listings
 - 9. Other material and information as indicated in individual specification sections and as necessary for operation and maintenance by Owner's personnel.

D. Form:

- 1. Hard copies of manuals shall be $8-1/2 \times 11$ inch text pages bound in three ring expansion binders with a hard durable plastic cover. All documents to be originals unless otherwise noted.
- 2. Prepare binder covers with printed subject title of manual, title of project, date, and volume number when multiple binders are required. Printing shall be on face and spine.
- 3. Internally subdivide the binder contents with divider sheets with typed tab titles under reinforced plastic tabs. Place dividers at beginning of each chapter, part, section, and appendix.
- 4. Provide a table of contents for each volume.
- 5. Provide directory listing as appropriate with names addresses, and telephone numbers of Architect, Contractor, subcontractors, equipment suppliers, and nearest service representatives. Provide emergency 24-hour service contact information for all subcontractors, service contractors and principal vendors.

1.4 WARRANTIES

- A. Provide duplicate notarized copies of special and extended warranties as required by individual specifications sections.
- B. Submit warranties to Architect prior to or in conjunction with submission of Notice of Substantial Completion.
- C. Execute and assemble warranties from subcontractors, suppliers, and manufacturers.
- D. Provide Table of Contents and assemble in three ring binder with a hard durable plastic cover. Internally subdivide the binder contents with permanent page dividers, with tab titling clearly typed under reinforced laminated plastic tabs.
- E. For items of work delayed beyond date of Substantial Completion, provide updated warranty submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.5 CERTIFICATES OF INSPECTION AND COMPLIANCE

- A. For inspections throughout the construction period required by regulatory agencies, obtain and maintain certificates issued to show compliance.
- B. Assemble certificates and any formal written evidence of regulatory compliance in three ring binder with table of contents and submit to Architect prior to or in conjunction with submission of Notice of Substantial Completion.
- C. Certificate of Occupancy: Prior to Substantial Completion, obtain from authorities having jurisdiction Certificate of Occupancy. Submit with Notice for Substantial Completion.

1.6 INSURANCE INFORMATION

A. Submit prior to or in conjunction with submission of Contractor's request for Substantial Completion information regarding insurance including change over requirements and insurance extensions.

1.7 MAINTENANCE TOOLS

- A. Provide all special tools, instruments, and other implements required for the functional operation and maintenance of equipment, systems, and other components installed as part of this project. Include screw drivers, crescent wrenches, pliers, and allen wrenches as well as more unique and atypical tools.
- B. Tools shall be as provided or recommended by manufacturers of installed equipment and systems. Types and sizes shall be as specifically required for installed products.
- C. Tools shall be available and their use demonstrated during training sessions specified in Section 01 7500 Starting, Adjusting, and Demonstrating.
- D. Prior to or concurrent with Contractor's request for Substantial Completion, deliver maintenance tools to Owner's representative. Prepare inventory of tools provided and obtain receipt from Owner's representative.

1.8 EXTRA MATERIALS

- A. Provide spare parts and maintenance materials in quantities specified in individual sections.
- B. Extra materials shall be produced by the same manufacturer of and compatible with the installed products.
- C. Prior to or concurrent with submission of Notice of Substantial Completion deliver extra materials in unopened containers to Owner's representative at designated storage area at project site and place in location as directed. Obtain receipt from Owner's representative.
- D. During one year correction period:
 - 1. Extra materials may be used by Contractor to replace expendable and normally worn parts.
 - 2. Extra materials used by Contractor for replacement of defective products shall be replaced at no additional cost to Owner.

1.9 KEYS

- A. Prior to or in conjunction with submission of Contractor's request for Substantial Completion, provide Owner with all keys for:
 - 1. Door hardware locks after rekeying in accordance with Section 087100 Door Hardware.
 - 2. Access doors and panels.
 - 3. Electrical panelboards and other equipment.
- B. Provide a minimum of two keys for each lock.
- C. Clearly label each key as to function and location of lock.
- D. Obtain receipt from Owner's representative.
- E. Prior to, or in conjunction with Final Completion, return all keys lent out by Owner to Contractor for access to existing spaces, gates, etc. for the Work. Obtain receipt from Owner.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION 01_7800

CLOSEOUT SUBMITTALS

SECTION 01_7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
 - 1. Section 01_3300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Section 01_9113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 **REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS**

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.

- 3. Date of submittal.
- 4. Name and contact information for Contractor.
- 5. Name and contact information for Architect.
- 6. Name and contact information for Commissioning Authority.
- 7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
- 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
 - 1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 - 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 - 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency.
 - 2. Emergency instructions.
 - 3. Emergency procedures.

- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 1. Fire.
 - 2. Flood.
 - 3. Gas leak.
 - 4. Water leak.
 - 5. Power failure.
 - 6. Water outage.
 - 7. System, subsystem, or equipment failure.
 - 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.
 - 3. Operating instructions for conditions outside normal operating limits.
 - 4. Required sequences for electric or electronic systems.
 - 5. Special operating instructions and procedures.

2.4 **OPERATION MANUALS**

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.

- C. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Seasonal and weekend operating instructions.
 - 8. Required sequences for electric or electronic systems.
 - 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared record Drawings in Section 01_7839 "Project Record Documents."
- G. Comply with Section 01_7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01_7823

SECTION 01_7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Product Data.
 - 3. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 01_7700 "Closeout Procedures" for general closeout procedures.
 - 2. Section 01_7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record prints.
- B. Record Product Data: Submit one paper copy of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- C. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or

entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
- b. Accurately record information in an acceptable drawing technique.
- c. Record data as soon as possible after obtaining it.
- d. Record and check the markup before enclosing concealed installations.
- e. Cross-reference record prints to corresponding archive photographic documentation.
- 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - 1. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
- 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
- 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
- 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
- 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, and record Drawings where applicable.
- B. Format: Submit record Product Data as paper copy.
 - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.3 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as paper copy.
 - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01_7839

SECTION 01_7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit one copy within 15 days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name of Architect.
 - c. Name of Contractor.
 - d. Date of video recording.
 - 2. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - 1. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.

- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01_7823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, with at least seven days' advance notice.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
 - 1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
 - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.

END OF SECTION 01_7900

DIVISION 02 – EXISTING CONDITIONS

VILLAGE OF TAOS SKI VALLEY – ADMINSTRATION BUILDING

SECTION 02_4100 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes demolition and removal of the following:
 - 1. Selected portions of a building or structure.
 - 2. Selected site elements.
 - 3. Repair procedures for selective demolition operations.
- B. See related sections:
 - 1. 01 1400 Access Control
 - 2. 01 3100 Project Management & Coordination

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.
- B. Owner shall be permitted first right of refusal for any/all items indicated for demolition in contract documents. Contractor shall notify owner minimum seven days in advance of demolition procedure, to allow owner the option to mark materials, equipment, and fixtures for salvage.

1.4 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
 - 1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

- C. Owner assumes no responsibility for condition of areas to be selectively demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site will not be permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 **REPAIR MATERIALS**

- A. Use repair materials identical to existing materials.
 - 1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 2. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped. Remove all portions of utilities scheduled for removal or relocation back to source or property line.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
 - 1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.
- C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If utility services are required to be removed, relocated, or abandoned, provide temporary utilities before proceeding with selective demolition that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- D. Utility Requirements: Refer to Division 15 and 16 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
 - 2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - 3. Protect existing site improvements, appurtenances, and landscaping to remain.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- C. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
- D. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- E. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.

- 1. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations.
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - 4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Existing Facilities: Comply with owner's requirements for using and protecting walkways, building entries, and other building facilities during selective demolition operations.
- C. Removed and Salvaged Items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 PATCHING AND REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.
- B. Patching: Comply with Division 1 Section "Cutting and Patching."
- C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
 - 1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.
- D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
- E. Floors and Walls: Where walls or partitions that are demolished extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
- F. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 02_4100

DIVISION 03 – CONCRETE

SECTION 03_0130 - MAINTENANCE OF CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removal of deteriorated concrete and subsequent patching.
 - 2. Floor joint repair.
 - 3. Epoxy crack injection.
 - 4. Corrosion-inhibiting treatment.
 - 5. Polymer sealers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: Cured samples for each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Product test reports.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer to apply packaged patching-mortar materials epoxy crack injection materials corrosion-inhibiting treatments and polymer sealers.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain each color, grade, finish, type, and variety of product from single source with resources to provide products of consistent quality in appearance and physical properties.
- B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

2.2 BONDING AGENTS

- A. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Manufactured product that consists of water-insensitive epoxy adhesive, portland cement, and water-based solution of corrosion-inhibiting chemicals that forms a protective film on steel reinforcement.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals Building Systems; Emaco P24.
 - b. Euclid Chemical Company (The), an RPM company; Duralprep A.C.
 - c. Kaufman Products, Inc.; Surepoxy HM EPL.
 - d. Sika Corporation, Construction Product Division; Armatec 110 EpoCem.
 - e. Sto Corp., Concrete Restoration Division; Sto Bonding and Anti-Corrosion Agent.
 - f.
- B. Epoxy Bonding Agent: ASTM C 881/C 881M, Type II (non load bearing) or Type V (load bearing) as applicable, and free of VOCs.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide Insert manufacturer's name; product name or designation or comparable product by one of the following:
 - a. BASF Construction Chemicals Building Systems.
 - b. ChemCo Systems.
 - c. Dayton Superior Corporation.
 - d. Euclid Chemical Company (The); an RPM company.
 - e. Kaufman Products, Inc.
 - f. Sika Corporation; Construction Product Division.
 - g. Sto Corp., Concrete Restoration Division.
 - h. Unitex.
 - i. US SPEC; Division of US MIX Products Company.
 - j. W. R. Meadows, Inc.
 - k.
- C. Latex Bonding Agent: ASTM C 1059/C 1059M, Type I and Type II at structural and exterior locations and where indicated, Type I at other locations.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Latex Bonding Agent, Type I (Redispersible):
 - 1) Dayton Superior Corporation; Superior Concrete Bonder (J-41) Conspec Weldtite Edoco PVA Bonding Agent.
 - 2) Euclid Chemical Company (The), an RPM company; Euco Weld Tammsweld.
 - 3) Kaufman Products, Inc.; Sureweld.
 - 4) US SPEC, Division of US MIX Products Company; Bondcoat PVA Multicoat EVA.
 - 5) W. R. Meadows, Inc.; Intralok.
 - b. Latex Bonding Agent, Type II (Non-Redispersible):

- 1) Dayton Superior Corporation; Conspec Strong Bond Day-Chem Ad Bond (J-40) Edoco Acrylic Bondcrete.
- 2) Euclid Chemical Company (The), an RPM company; Akkro-7T Flex-Con SBR Latex.
- 3) Kaufman Products, Inc.; Surebond.
- 4) US SPEC, Division of US MIX Products Company; US Spec Acrylcoat.
- 5) W. R. Meadows, Inc.; Sealtight Acry-Lok.
- 6)

2.3 PATCHING MORTAR

- A. Patching Mortar, General:
 - 1. Only use patching mortars that are recommended by manufacturer for each applicable horizontal, vertical, or overhead use orientation.
 - 2. Color and Aggregate Texture: Provide patching mortar and aggregates of colors and sizes necessary to produce patching mortar that matches existing, adjacent, exposed concrete where repair will be visible.
 - 3. Coarse Aggregate for Patching Mortar: ASTM C 33, washed aggregate, Size No. 8, Class 5S. Add to patching-mortar mix only as permitted by patching-mortar manufacturer.
- B. Cementitious Patching Mortar: Packaged, dry mix for repair of concrete.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide appropriate or comparable product by one of the following:
 - a. BASF Construction Chemicals Building Systems.
 - b. CGM, Incorporated.
 - c. Dayton Superior Corporation.
 - d. Euclid Chemical Company (The); an RPM company.
 - e. Fox Industries, Inc.
 - f. Kaufman Products, Inc.
 - g. Sika Corporation; Construction Product Division.
 - h. Sto Corp.; Concrete Restoration Division.
 - i. Unitex.
 - j. US SPEC; Division of US MIX Products Company.
 - k. W. R. Meadows, Inc.
 - 1.
 - 3. Compressive Strength: Not less than 4000 psi (27.6 MPa) or 5000 psi (34.5 MPa) per Structural Engineer's requirements at 28 days, or as prescribed by Structural Engineer, when tested according to ASTM C 109/C 109M.
- C. Rapid-Strengthening, Cementitious Patching Mortar: Packaged, dry mix, ASTM C 928 for repair of concrete.
 - 1. with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or as required, product by one of the following:

- a. BASF Construction Chemicals Building Systems.
- b. CGM, Incorporated.
- c. Dayton Superior Corporation.
- d. Euclid Chemical Company (The); an RPM company.
- e. Fox Industries, Inc.
- f. Kaufman Products, Inc.
- g. Sika Corporation; Construction Product Division.
- h. Sto Corp.; Concrete Restoration Division.
- i. Unitex.
- j. US SPEC; Division of US MIX Products Company.
- k. W. R. Meadows, Inc.
- l. .
- 3. Compressive Strength: Not less than 1000 psi (7.0 MPa), 2000 psi (13.8 MPa), 3000 psi (21.0 MPa) or 4000 psi (27.6 MPa) as required per Structural Engineer within three hours when tested according to ASTM C 109/C 109M.
- D. Polymer-Modified, Cementitious Patching Mortar: Packaged, dry mix for repair of concrete and that contains a non-redispersible latex additive as either a dry powder or a separate liquid that is added during mixing.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. AQUAFIN, Inc.
 - b. BASF Construction Chemicals Building Systems.
 - c. CGM, Incorporated.
 - d. Cortec Corporation.
 - e. Dayton Superior Corporation.
 - f. Euclid Chemical Company (The); an RPM company.
 - g. Fox Industries, Inc.
 - h. Kaufman Products, Inc.
 - i. Sika Corporation; Construction Product Division.
 - j. Sto Corp.; Concrete Restoration Division.
 - k. US SPEC; Division of US MIX Products Company.
 - l. W. R. Meadows, Inc.
 - m. .
 - 3. Compressive Strength: Not less than 4000 psi (27.6 MPa) or 5000 psi (34.5 MPa) per Structural Engineer at 28 days or as required by Structural Engineer when tested according to ASTM C 109/C 109M.

2.4 JOINT FILLER

- A. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A Shore durometer hardness of at least 80 according to ASTM D 2240.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals Building Systems; Masterfill 300i.

- b. ChemCo Systems; CCS Grout, Control Joint or Control Joint HB.
- c. Dayton Superior Corporation; PoxyFil (J-52).
- d. Euclid Chemical Company (The), an RPM company; Euco 700 or 800.
- e. Kaufman Products, Inc.; Surepoxy Flexijoint.
- f. Metzger/McGuire; MM-80 or Edge-Pro XL.
- g. Sika Corporation, Construction Product Division; Sikadur 51 NS or Sikadur 51 SL.
- h. Unitex; Pro-Flex or Pro-Flex Gel.
- i. US SPEC, Division of US MIX Products Company; SR 50 EJF.
- j. W. R. Meadows, Inc.; Sealtight Rezi-Weld Flex.
- k.
- B. Color: Matching existing joint filler or as selected by Architect from full range of industry colors.

2.5 EPOXY CRACK-INJECTION MATERIALS

- A. Epoxy Crack-Injection Adhesive: ASTM C 881/C 881M, Type I, Type IV, Type IV at structural locations and where indicated, Type I at other locations; free of VOCs.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. BASF Construction Chemicals Building Systems.
 - b. ChemCo Systems.
 - c. Dayton Superior Corporation.
 - d. Euclid Chemical Company (The); an RPM company.
 - e. Kaufman Products, Inc.
 - f. Sika Corporation; Construction Product Division.
 - g. Sto Corp.; Concrete Restoration Division.
 - h. Unitex.
 - i. US SPEC; Division of US MIX Products Company.
 - j. W. R. Meadows, Inc.
 - k.
 - 3. Capping Adhesive: Product manufactured for use with crack injection adhesive by same manufacturer.

2.6 OTHER MATERIALS

- A. Corrosion-Inhibiting Treatment: Waterborne solution of alkaline corrosion-inhibiting chemicals for concrete-surface application that penetrates concrete by diffusion and forms a protective film on steel reinforcement.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cortec Corporation; MCI 2020 Series.
 - b. Euclid Chemical Company (The), an RPM company; Duralprep 3020.
 - c. Evonik Degussa Corporation; Protectosil CIT.
 - d. Fox industries, Inc.; FX-361 Migratory Corrosion Inhibitor.
 - e. Sika Corporation, Construction Product Division; Sika FerroGard 903.

- f. Sto Corp., Concrete Restoration Division; Sto Migratory Corrosion Inhibitor CR247.
- g.
- B. Polymer Sealer: Low-viscosity epoxy or high-molecular-weight methacrylate penetrating sealer and crack filler recommended by manufacturer for penetrating and sealing cracks in exterior concrete traffic surfaces; free of VOCs VOC content 100 g/L or less VOC content 400 g/L or less Insert requirement.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Epoxy Sealers:
 - 1) BASF Construction Chemicals Building Systems; EpoXeal GS.
 - 2) ChemCo Systems; Epoxy Healer Sealer.
 - Euclid Chemical Company (The), an RPM company; Euco #512 VOC Epoxy Sealer DURAL 335.
 - 4) Sika Corporation, Construction Product Division; Sikadur 55 SLV.
 - 5) Unitex; Pro-Poxy 50-1.
 - 6) US SPEC, Division of US MIX Products Company; Eposeal LVS.
 - 7)
 - b. High-Molecular-Weight Methacrylate Sealers:
 - 1) BASF Construction Chemicals Building Systems; Degadeck Crack Sealer Plus.
 - 2) Castek, Inc., Subsidiary of Transpo Industries, Inc.; Sealate T70.
 - 3) Kwik Bond Polymers; KBP 204.
 - 4) Sika Corporation, Construction Product Division; SikaPronto 19.
 - 5)
- C. Portland Cement: ASTM C 150, Type I, II, or III unless otherwise indicated.

2.7 MIXES

- A. General: Mix products, in clean containers, according to manufacturer's written instructions.
- B. Dry-Pack Mortar: Mix patching-mortar dry ingredients with just enough liquid to form damp cohesive mixture that can be squeezed by hand into a ball but is not plastic.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Notify Construction Manger seven days in advance of dates when areas of deteriorated or delaminated concrete and deteriorated reinforcing bars will be located.
- B. Locate areas of deteriorated or delaminated concrete using hammer or chain-drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries. At columns and walls make boundaries level and plumb unless otherwise indicated.
- C. Pachometer Testing: Locate at least three reinforcing bars using a pachometer, and drill test holes to determine depth of cover. Calibrate pachometer using depth of cover measurements, and verify depth of cover in removal areas using pachometer.

D. Perform surveys as the Work progresses to detect hazards resulting from concrete-maintenance work.

3.2 PREPARATION

- A. Ensure that supervisory personnel are on-site and on duty when concrete maintenance work begins and during its progress.
- B. Preparation for Removal of Deteriorated Concrete: Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed in the course of repair.
 - 1. Verify that affected utilities have been disconnected and capped.
 - 2. Provide and maintain shoring, bracing, and temporary structural supports as required to preserve stability and prevent unexpected or uncontrolled movement, settlement, or collapse of construction being demolished and construction and finishes to remain.
- C. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from concrete maintenance work.
 - 1. Comply with each product manufacturer's written instructions for protections and precautions.
 - 2. Contain dust and debris generated by concrete maintenance work and prevent it from reaching the public or adjacent surfaces.
 - 3. Protect floors and other surfaces along haul routes from damage, wear, and staining.
 - 4. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.
 - 5. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
- D. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Owner / Construction Manager immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is in working order.
 - 1. Prevent solids such as aggregate or mortar residue from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from concrete maintenance work.
 - 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.
- E. Concrete Removal:
 - 1. Provide shoring, bracing, and supports as necessary. Strengthen or add new supports when required during progress of removal work. Do not overload structural elements with debris.
 - 2. Saw-cut perimeter of areas indicated for removal to a depth of at least 1/2 inch (13 mm) or as required. Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcement.
 - 3. Remove deteriorated and delaminated concrete by breaking up and dislodging from reinforcement.
 - 4. Remove additional concrete if necessary to provide a depth of removal of at least 1/2 inch (13 mm) over entire removal area.
 - 5. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar and to provide at least a 3/4-inch (19-mm) clearance around bar.
 - 6. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound and disbonded concrete is completely removed.
 - 7. Provide surfaces with a fractured profile of at least 1/8 inch (3 mm) that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level unless otherwise directed.

- 8. Thoroughly clean removal areas of loose concrete, dust, and debris.
- F. Reinforcing-Bar Preparation: Remove loose and flaking rust from reinforcing bars by abrasive blast cleaning needle scaling or wire brushing until only tightly adhered light rust remains.
 - 1. Where section loss of reinforcing bar is more than 25 percent, or 20 percent in two or more adjacent bars, cut bars and remove and replace as directed by Structural Engineer. Remove additional concrete as necessary to provide at least 3/4-inch (19-mm) clearance at existing and replacement bars. Splice replacement bars to existing bars according to ACI 318 (ACI 318M) by lapping, welding, or using mechanical couplings.
- G. Preparation of Floor Joints for Repair: Saw-cut joints full width to edges and depth of spalls, but not less than 3/4 inch (19 mm) or 1 inch (25 mm) or 2 inches (50 mm) depth as required. Clean out debris and loose concrete; vacuum or blow clear with compressed air.

3.3 APPLICATION

- A. General: Comply with manufacturer's written instructions and recommendations for application of products, including surface preparation.
- B. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Apply to reinforcing bars and concrete according to manufacturer's written instructions. Apply to reinforcing bars in two coats, allowing first coat to dry two to three hours before applying second coat. Allow to dry before placing patching mortar.
- C. Epoxy Bonding Agent: Apply to reinforcing bars and concrete according to manufacturer's written instructions, leaving no pinholes or other uncoated areas. Apply to reinforcing bars in at least two coats, allowing first coat to dry before applying second coat. Place patching mortar while epoxy is still tacky. If epoxy dries, recoat before placing patching mortar.
- D. Latex Bonding Agent, Type I: Apply to concrete by brush roller or spray. Allow to dry before placing patching mortar.
- E. Latex Bonding Agent, Type II: Mix with portland cement and scrub into concrete surface according to manufacturer's written instructions. Place patching mortar while bonding agent is still wet. If bonding agent dries, recoat before placing patching mortar.
- F. Slurry Coat for Cementitious Patching Mortar: Wet substrate thoroughly and then remove standing water. Scrub a slurry of neat patching mortar mixed with latex bonding agent into substrate, filling pores and voids.
- G. Placing Patching Mortar: Place as follows unless otherwise recommended in writing by manufacturer:
 - 1. Provide forms where necessary to confine patch to required shape.
 - 2. Wet substrate and forms thoroughly and then remove standing water.
 - 3. Pretreatment: Apply specified bonding agent and slurry coat.
 - 4. General Placement: Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. For large patches, fill edges first and then work toward center, always troweling toward edges of patch. At fully exposed reinforcing bars, force patching mortar to fill space behind bars by compacting with trowel from sides of bars.
 - 5. Lifts: Place material in lifts of not more nor less than thickness recommended by manufacturer. Do not feather edge.
 - 6. Consolidation: After each lift is placed, consolidate material and screed surface.

- 7. Multiple Lifts: Where multiple lifts are used, score surface of lifts to provide a rough surface for placing subsequent lifts. Allow each lift to reach final set before placing subsequent lifts.
- 8. Finishing: Allow surfaces of lifts that are to remain exposed to become firm and then finish to a surface matching adjacent concrete.
- 9. Curing: Wet-cure cementitious patching materials, including polymer-modified cementitious patching materials, for not less than seven days by water-fog spray or water-saturated absorptive cover.
- H. Dry-Pack Mortar: Use for deep cavities and where indicated. Place as follows unless otherwise recommended in writing by manufacturer:
 - 1. Provide forms where necessary to confine patch to required shape.
 - 2. Wet substrate and forms thoroughly and then remove standing water.
 - 3. Pretreatment: Apply specified bonding agent and slurry coat.
 - 4. Place dry-pack mortar into cavity by hand, and compact tightly into place. Do not place more material at a time than can be properly compacted. Continue placing and compacting until patch is approximately level with surrounding surface.
 - 5. After cavity is filled and patch is compacted, trowel surface to match profile and finish of surrounding concrete.
 - 6. Wet-cure patch for not less than seven days by water-fog spray or water-saturated absorptive cover.
- I. Floor-Joint Repair: Cut out deteriorated concrete and reconstruct sides of joint with patching mortar as indicated on Drawings. Install joint filler in nonmoving floor joints where indicated and as follows:
 - Depth: Install joint filler to a depth of at least [3/4 inch (19 mm)] [1 inch (25 mm)] [2 inches (50 mm)] as required. Use fine silica sand no more than 1/4 inch (6 mm) deep to close base of joint. Do not use sealant backer rods or compressible fillers below joint filler.
 - 2. Top Surface: Install joint filler so that when cured, it is flush at top surface of adjacent concrete. If necessary, overfill joint and remove excess when filler has cured.
- J. Epoxy Crack Injection:
 - 1. Clean areas to receive capping adhesive of oil, dirt, and other substances that would interfere with bond, and clean cracks with oil-free compressed air or low-pressure water to remove loose particles.
 - 2. Place injection ports as recommended by epoxy manufacturer, spacing no farther apart than thickness of member being injected. Seal injection ports in place with capping adhesive.
 - 3. Seal cracks at exposed surfaces with a ribbon of capping adhesive at least 1/4 inch (6 mm) thick by 1 inch (25 mm) wider than crack.
 - 4. Inject cracks wider than 0.003 inch (0.075 mm) to a depth of 8 inches (200 mm).
 - 5. Inject epoxy adhesive, beginning at widest part of crack and working toward narrower parts. Inject adhesive into ports to refusal, capping adjacent ports when they extrude epoxy. Cap injected ports and inject through adjacent ports until crack is filled.
 - 6. After epoxy adhesive has set, remove injection ports and grind surfaces smooth.
- K. Corrosion-Inhibiting Treatment: Apply in two coats at manufacturer's recommended application rate. Remove film of excess treatment before patching treated concrete or applying a sealer.
 - 1. Apply to the following: As required.
- L. Polymer Sealer: Apply by brush, roller, or airless spray at manufacturer's recommended application rate.
 - 1. Apply to the following: As required..
3.4 FIELD QUALITY CONTROL

- A. Testing Agency: General Contractor to engage a qualified testing agency to perform all necessary tests and inspections, at General Contractors expense.
- B. Perform the following tests and inspections:
 - 1. Packaged, Cementitious Patching Mortar: 3, or quantity per manufacture's recommendation, randomly selected sets of samples for each type of mortar required, tested according to ASTM C 928.
 - 2. Joint Filler: Core-drilled samples to verify proper installation.
 - a. Testing Frequency: One sample for each 100 feet (30 m) of joint filled.
 - b. Where samples are taken, refill holes with joint filler.
 - 3. Epoxy Crack Injection: Core-drilled samples to verify proper installation.
 - a. Testing Frequency: 3 samples from mockup and 1 sample for each 100 feet (30 m) of crack injected.
 - b. Where samples are taken, refill holes with epoxy mortar.
- C. Product will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 03_0130

SECTION 03_1000 CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section includes formwork for cast-in-place concrete, including water stops, and installation of embedded items.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Reinforcement Section 03 2000
- B. Cast-In-Place Concrete Section 03_3000
- C. Under-Slab Vapor Retarder Section 07 26 00

1.3 QUALITY ASSURANCE

A. Comply with the American Concrete Institute Standard, ACI 347-04, Recommended Practice for Concrete Formwork.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1.	ASTM D 226-09	Specification for Asphalt - Saturated Organic Felt used in Roofing and Waterproofing"
2.	ASTM D 1751-04	Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood complying with Voluntary Product Standard PS 1-07 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better or metal, metal-framed plywood or other acceptable panel-type materials. Plywood shall be mill-oiled and edge-sealed, with each piece bearing legible inspection trademark. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
- B. Forms for Unexposed Finish Concrete: Use plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Commercial formulation that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- D. Chamfer Strips: ³/₄ inch by ³/₄ inch wood, PVC, or rubber.
- E. Preformed Construction Joint: 24-gage steel, galvanized, shaped to form a continuous tongue and groove key.
- F. Preformed Control Joint: Rigid plastic or metal strip with removable top section.

- G. Expansion Joint Material: Asphalt saturated fiberboard, ½ inch thick, meeting the requirements of ASTM D 1751.
- H. Felt: Asphalt-saturated organic felt, weighing 30 pounds per 100 square feet, meeting the requirements of ASTM D 226.
- I. Recycled Content: Minimum 5 percent post-consumer content, or minimum 20 percent preconsumer recycled content at contractor's option.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

3.2 PREPARATION

A. Form Coating: Coat contact surfaces of forms with a form coating compound before reinforcement is placed. Thin form-coating compounds with thinning agent and apply as specified in manufacturer's instructions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.

3.3 INSTALLATION

- A. Formwork: Formwork shall support vertical and lateral loads that are applied until such loads can be supported by concrete structure. Formwork shall be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Construct forms to sizes, shapes, lines and dimensions shown. Perform surveys to obtain accurate alignment. Provide for recesses, chamfers, blocking, anchorages, inserts, and other features required in work. Select materials to obtain required finishes. Butt joints solidly and provide backup at joints to prevent leakage of cement paste.
- B. Chamfer Strips: Provide at exposed corners and edges.
- C. Form Ties: Use factory fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.
- D. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.4 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set anchorage devices and other embedded items accurately. Use setting drawings, diagrams, templates and printed instructions provided by supplier. Secure embedded items such that they are not displaced during placement of concrete.
- B. Water stops: Install according to manufacturers printed instructions. Splice water stop sections using square cut butt joints and fuse sections together with indirect heat from preheated splicing iron. Use of direct flame is prohibited.
- 3.5 JOINTS

- A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints unless noted otherwise.
- B. Keyways: Provide keyways at least 1-¹/₂ inch deep in construction joints in walls and slabs.
- C. Preformed Construction Joint For Slabs on Grade: Secure with galvanized steel stakes, 1/8 inch thick by 1-1/8 inches wide with ½ inch deep rib and tapered point. Splice adjoining joints with 24 gage steel, galvanized splice plates.
- D. Isolation Joints in Slabs on Grade: Construct isolation joints in interior slabs using 30 lb. felt. Provide isolation joints at points of contact between slabs on grade and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated. Construct isolation joints on exterior slabs abutting vertical surfaces with ½ inch thick expansion joint material.
- E. Control Joints in Slabs-on-Grade:
 - 1. Preformed Strip: Insert premolded rigid plastic, or metal strip into fresh concrete. Cut groove for strip using 10-foot long straight edge cutting tool. Depths of strip shall be one fourth of slab thickness. Press strip into groove such that top of strip is level with the concrete surface. Pull off removable top section, if any, prior to troweling.
 - 2. Saw Cut: Contractor may saw cut control joints instead of using preformed strips. Saw cut joints shall be 1/8 inch wide. Saw cut depth should equal 1/3 of slab depth. Cut joints after concrete has hardened sufficiently to prevent raveling; usually 4 to 12 hours after slab has been cast and finished. Use diamond or silicone-carbide blades.
- F. Control Joints in Walls: Create weakened planes in cantilevered retaining walls at 25 feet on center. Use preformed strips, placed vertically, full height in each face of wall. Depth of strips shall be one inch.

3.6 REMOVAL OF FORMWORK

- A. General: Prevent excessive deflection, distortion, and damage to concrete when forms are stripped. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
- B. Formwork and supports at sides of concrete shall remain in place for 24 hours after concrete placement. This period represents cumulative number of hours, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 degrees F. Formwork and shoring which support the weight of concrete shall not be removed until concrete has attained its specified compressive strength.
- C. Ensure safety of the structure. Do not superimpose any load on concrete until forms are removed and concrete is cured.

3.7 RE-USE OF FORMS

A. General: Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

When forms are intended for successive concrete placement, thoroughly clean surfaces and remove fins and latence. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces.

END OF SECTION 03_1000

SECTION 03_1119 INSULATED CONCRETE FORMING

PART 1 GENERAL

1.01 SUMMARY

- A. Comply with the requirements for Division 1.
- B. Supply & installation of insulated concrete forms, installation of reinforcing steel and placement of concrete within formwork.
- C. Adequate bracing and falsework shall be provided by the Installing Contractor to comply with all applicable Codes.

1.01.1 SCOPE OF WORK

- A. Furnish all labor, materials, tools and equipment to perform the installation of BuildBlock[®] wall system forms as manufactured by BuildBlock Building Systems, LLC. 9705 North Broadway Extension, Suite 200, Oklahoma City, Oklahoma 73114. Phone (405) 840-3386. Or an approved equal product.
- B. Furnish all labor to include placement of reinforcing steel within forms, placement of concrete into forms, and final cleanup.

1.03 PRODUCTS SUPPLIED BUT NOT SPECIFIED OR INSTALLED UNDER THIS SECTION

- A. *EPS* compatible modified bituminous sheet waterproofing membrane.
- B. *EPS* compatible parge coat.

1.04 PRODUCTS INSTALLED BUT NOT SPECIFIED OR SUPPLIED UNDER THIS SECTION

- A. Sleeves
- B. Inserts
- C. Anchors
- D. Bolts
- E. Reinforcing Steel
- F. Window & Door Opening Bucks
- G. Concrete

1.05 RELATED SECTIONS

- A. Section 03 20 00 Concrete Reinforcing
- B. Section 03 3000 Cast-In-Place Concrete
- C. Division 06 Wood, Plastics and Composites
- G. Division 08 Openings
- K. Section 09 2423 Plaster & Gypsum Board

1.06 ALTERNATES

A. As approved by Owner/Architect.

1.07 REFERENCES

- A. ACI 318 Building Code Requirements for Reinforced Concrete
- B. ACI 332 Guide to Residential Cast-in-Place Concrete Construction

INSULATED CONCRETE FORMING

C.	ASTM C236	Steady State Thermal Perfor	rmance of Building Assemblies
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- D. ASTM C473 Physical Testing of Gypsum Board Products & Gypsum Lath
- E. ASTM D1761 Mechanical Fasteners in Wood
- F. ASTM E84 Surface Burning Characteristics of Building Materials
- G. UBC 26-3 Uniform Building Code Standard Room Fire Test

1.08.1 **DEFINITIONS**

- A. *Contractor Installer* An installation contractor, who has received instructional training in the installation of BuildBlock wall system forms (as administered by BuildBlock Building Products)
- B. *Technical Advisor* A technical representative, usually a staff member of a Distribution Firm, who has received instructional training in the installation of BuildBlock wall system forms (as administered by BuildBlock Building Products) and is in the capacity of supervising an installation crew on site.
- C. *EPS* Acronym for "Expanded Polystyrene" when referencing the insulating foam component of the Arxx wallsystem form.
- D. ICF- Acronym for "Insulated Concrete Form".
- F. *Window or Door Opening Buck-* a pre-manufactured or site constructed frame assembly consisting of wood or plastic material used to frame a rough opening within the forming system that will retain concrete around the opening. The frame can also provide for subsequent anchorage of doors and windows within the wall assembly.

1.09 SYSTEM DESCRIPTION / PERFORMANCE REQUIREMENTS

- A. Insulated concrete wall form system shall consist of 2 flame resistant panels of Expanded Polystyrene (*EPS*) connected by high-density polypropylene webs.
- B. Wall system to provide min. 4", 6", 8" or 10" (100, 160, 200 or 250mm) wall section (as required) at all locations throughout wall area.
- C. Wall system webs to provide min. 1" (25mm) wide fastening strips @ 8" (200mm) o/c flush to wall face for full wall height to facilitate finish fastening both interior and exterior.
- D. Wall system to provide accurate positioning of steel within form cavity to conform to reinforcing requirements of ACI 318.
- E. *EPS* foam panels with concrete to provide min. insulation levels as noted:
 - 4" (100 mm) Cavity Form Unit: R 17.1 (RSI 3.01)
 - 6" (160 mm) Cavity Form Unit: R 22.1 (RSI 3.89)
 - 8" (200 mm) Cavity Form Unit: R 21.7 (RSI 3.82)
 - 10" (250 mm) Cavity Form Unit: R 21.8 (RSI 3.83)
- F. *EPS* foam to provide maximum vapor permeation of 3.5 Perm-in. (200 ng/Pa.s.m²)
- G. Finished wall assembly to provide min. rating of STC 50 sound attenuation performance.

1.10 SUBMITTALS

INSULATING CONCRETE FORMING

- A. Submit relevant laboratory tests or data that validate product compliance with performance criteria specified prior to commencement of work under this Section.
- B. Submit copy of Manufacturer's Product Manual

1.11 QUALITY ASSURANCE

- A. Contractor shall engage an BuildBlock wall systems trained *Contractor Installer* or *Technical Advisor* for the duration of the work under this Section.
- B. *Contractor Installer /Technical Advisor* shall furnish proof of training documentation to Contractor prior to commencement of work under this Section.
- C. Site Mock-up: If required, construct sample wall mock-up panel to include full wall system and details, located where directed by Consultant. Panel may form part of finished work if approved by Consultant.
- D. *Contractor Installer/Technical Advisor* to meet with Contractor prior to material delivery on site to co-ordinate provision of access, storage area, and protection of BuildBlock wall system product and spatial requirements for form alignment placement steel storage & forming.

1.12 DELIVERY STORAGE & HANDLING

- A. Deliver products in original factory packaging, bearing identification of product, manufacturer and batch/lot number.
- B. Handle and store products in location to prevent damaging and soiling.
- C. Ensure that UV protection is provided for material, should on-site storage extend beyond 30 days.

1.13 PROJECT CONDITIONS

A. Use appropriate measures for protection and supplementary heating when required to ensure proper curing conditions in accordance with manufacturer's recommendations if installation is carried out during periods of weather where temperatures are below minimum specified by governing Building Code for concrete and masonry.

1.14 COORDINATION

A. Ensure those materials listed under Sub-Section 1.03 & 1.04 are provided to *Contractor Installer* prior to commencement of work under this Section.

1.15 WARRANTY

A. Contact Manufacturer for supply of written copy of specific warranties of the product.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A BuildBlock Building Systems LLC 9705 North Broadway Extension, Suite 200 Oklahoma City, Oklahoma 73114 K9A 5V2 Phone: (405) 840-3386
- **B.** Or approved equal per Owner/Architect.

2.02 MATERIALS

A. Insulated concrete forms shall be BuildBlock Building System's forms; Product: BuildBlock[®].
 Available through BuildBlock Building Systems, LLC. 9705 North Broadway Extension, Suite 200, Oklahoma City, Oklahoma 73114. Phone (405) 840-3386.

2.03 COMPONENTS

A. Provide BuildBlocks System forms as listed below as may be required for proper execution of the work: BB-400 Straight Form (4 inch (102mm) concrete core) - 48" L x 9" W x 16" H BB-600 Straight Form (6 inch (152mm) concrete core) – 48" L x 11" W x 16" H BB-800 Straight Form (8 inch (203mm) concrete core) – 48" L x 13" W x 16" H BL-400 Knockdown Straight Form (4 inch (102mm) concrete core) – 48" L x 9" W x 16" H BL-600 Knockdown Straight Form (6 inch (152mm) concrete core) – 48" L x 11" W x 16" H BL-800 Knockdown Straight Form (8 inch (203mm) concrete core) – 48" L x 13" W x 16" H BL-1000 Knockdown Straight Form (10 inch (254mm) concrete core) – 48" L x 15" W x 16" H BL-1200 Knockdown Straight Form (12 inch (305mm) concrete core) – 48" L x 17" W x 16" H BB-490 90 Degree Corner form (4 inch (102mm) concrete core) – Left and Right BB-690 90 Degree Corner form (6 inch (152mm) concrete core) - Left and Right BB-890 90 Degree Corner form (8 inch (203mm) concrete core) - Left and Right BL-1090 Knockdown 90 Degree Corner form (10 inch (254mm) concrete core) - Left and Right BL-1290 Knockdown 90 Degree Corner form (8 inch (305mm) concrete core) – Left and Right BB-445 45 Degree Corner form (4 inch (102mm) concrete core) - Left and Right BB-645 45 Degree Corner form (6 inch (152mm) concrete core) - Left and Right BB-845 45 Degree Corner form (8 inch (203mm) concrete core) - Left and Right BB-6BL Straight Brick Ledge form (6 inch (152mm) concrete core) BB-8BL Straight Brick Ledge form (8 inch (203mm) concrete core

BB-6DT Double Taper Top Block Form (6 inch (152mm) concrete core)

BB-8DT Double Taper Top Block Form (6 inch (203mm) concrete core)

- All webs composed of polypropylene meeting ASTM-D-635 for Rate of Burning and/or Extent and time of Burning of Plastics in a Horizontal Position, and ASTM-D-1929 Method for determining Ignition Temperature of Plastics.
- All forms are 1.5 lb/ft³ minimum density Expanded Polystyrene.
- Flame Spread of all beads used meet: ASTM-E-84 Equals 25 or less.

Smoke Development of all beads used meet: ASTM-E-84 Equals 450 or less.

Sound Transmission: ASTM-E90-04 Equal to or greater than 57

Mechanical Fastener testing meets: ASTM-D-1761-88 Type 'S' Course Thread Drywall Screw Withdrawal load = 43.1 lbs (safety factor of 3) Lateral Resistance load = 79 lbs (safety factor of 3)

2.04 CONCRETE

- Concrete supplied under Section 03 3000 shall be of strength as specified by the design engineer (measured at 28 days). Recommended aggregate size to be 3/8" (10mm) aggregate for the 4" & 6" (100 & 160mm) forms and, ³/₄" (19mm) aggregate for the 8" & 10" (200 & 250mm) forms.
- B. Recommended concrete slump is 4" to 6" +/- 1" (100 to 150mm +/- 25mm) (subject to design revision to suit application).

2.05 REINFORCING STEEL

A. Reinforcing steel shall be as specified in Section 03 2000 and shall be supplied under that Section for placement by the BuildBlock *Contractor Installer*.

2.06 WALL ALIGNMENT SYSTEM

- A. To aid in the construction of the wall system, and to provide an adjustable device for ensuring plumbness of the wall during construction, where appropriate shall be used.
- B. Bracing, wall alignment, and Scaffolding: Must meet all local building codes.

2.07 WATERPROOFING

- A. Where called for on drawings, Waterproofing shall be Peel & Stick Modified Bituminous Sheet Waterproofing Membrane. Material to be supplied under this Section & installed as specified under Section 07 1300 (Sheet Waterproofing).
- B. Waterproofing material shall be *EPS* foam compatible.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect all areas included in Scope of Work to establish extent of work and verify site access conditions.
- B. Verify all building lines, and building dimensions. Verify footings and/or slabs level within ¹/₄ inch. Verify elevation of site before proceeding with formwork.
- C. Verify all materials, tools, equipment and forms are available for installing formwork.
- D. Verify all materials, tools, equipment and forms are available for installing formwork.

3.02 SITE VERIFICATION OF CONDITIONS

- A. Verify that site conditions are as set out in Part 1- General Conditions.
- C. Examine footings installed under Section 03 30 00 are within +/-1/4"(6mm) of level and that steps in footings are 16 3/4" (425 mm) in height.
- D. If specified, ensure reinforcing steel dowels are in place at specified centers along footing lengths
- E. Inspect erected formwork, shoring and bracing to ensure that work is in accordance with design, and that elements are secure.
- F. Ensure that all formwork is level, plumb, square and straight and that all dimensions are correct as per the plans or drawings.

3.03 PREPARATION

A. Clean all debris from top of footings prior to commencing work.

3.04 INSTALLATION

- A. Installation of forms to be in strict accordance with Manufacturer's Product Manual as supplied in evidence to contractor under Sub Section 1.10 of this Section.
- B. The Installation Contractor shall ensure Manufacturer's procedures for the following work are employed on site (As outlined in the Manufacturer's Installation Manual):
 - (a) First Course Placement
 - (b) Horizontal Reinforcement Placement
 - (c) Successive Course Placement
 - (d) Door & Window Opening Construction
 - (e) Form Alignment & Scaffolding Installation
 - (f) Vertical Reinforcement Placement
 - (g) Pre-Concrete Placement Inspection
 - (h) Concrete Placement
 - (i) Alignment Assembly Removal

3.05 SERVICE PENETRATIONS

- A. Service penetrations (e.g.- electrical service conduits, water service pipes, air supply and exhaust ducts etc.) shall be installed at the required locations as indicated by the appropriate trade.
- B. Service penetrations exceeding 16" x 16" (400mm x 400mm) in area shall be reinforced.
- C. Prior to concrete placement, install service penetration sleeves (supplied by others) at designated locations to create voids where services can be passed through at later date.

3.06 CLEANING

- A. Clean forms as installation proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.
- E. All formwork should be free and clear of concrete overspills. All bucks and openings should be clean and bracing removed after concrete cures as per engineers specifications. All floors should be scrapped and cleaned of concrete spills.
- F. Clean up and dispose of all debris on the job site related to the installation of the BuildBlock Insulating Concrete Forms.

3.06.1 PROTECTION

A. Provide temporary coverage of installation to reduce exposure to Ultra Violet light should final finish application be delayed longer than 60 days.

END OF SECTION 03_1119

SECTION 03_2000 CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section includes fabrication and installation of deformed bar and welded wire fabric reinforcing steel.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Forming and Accessories Section 03_1000.
- B. Cast In Place Concrete Section 03_3000.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. American Concrete Institute (ACI)

a.	ACI 301-05	Specifications for Structural Concrete for Buildings
b.	ACI 315-99	Details and Detailing of Concrete Reinforcement
c.	ACI 318-05	Building Code Requirements for Structural Concrete

2. American Society for Testing and Materials (ASTM)

a.	ASTM A 82/ 07	Standard Specification for Steel Wire, plain, A82M for Concrete Reinforcement	[-
b.	ASTM A 185/	Standard Specification for Steel Welded A185M-0 Wire Reinforcement, Plain, for Concrete	17
c.	ASTM A 615/ 615M-09b	Standard Specification for Deformed and A Plain Carbon-Steel Bars for Concrete Reinforcement	

3. Concrete Reinforcing Steel Institute (CRSI). Design Handbook - 2002 Edition

1.4 SUBMITTALS

A. Shop Drawings: Submit shop drawings for reinforcing steel. Comply with ACI 315 requirements showing layout, bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of reinforcing steel. Shop Drawings shall not be made by reproduction of the Contract Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60. Stirrups and ties may be Grade 40.
- B. Welded Wire Fabric: ASTM A 185, flat sheets.

- C. Steel Wire: ASTM A 82, 16 gage.
- D. Supports for Reinforcing Steel: Wire bar type and precast concrete block type meeting the requirements of CRSI Manual of Standard Practice.

2.2 FABRICATION

- A. Fabricate reinforcing steel in accordance with fabricating tolerances in ACI 315.
- B. Do not fabricate reinforcing steel until shop drawings are approved.

PART 3 - EXECUTION

3.1 PLACING BAR SUPPORTS

- A. General: Provide bar supports meeting the requirements of CRSI Specification for Placing Bar Supports.
- B. Slabs-on-grade: Use supports with sand plates or precast concrete blocks or horizontal runners where base material will not support chair legs.

3.2 PLACING REINFORCING STEEL

- A. General: Comply with CRSI Code of Standard Practice for "Placing Reinforcing Bars".
- B. Clean reinforcing steel of loose rust and mill scale, earth, ice, and other materials, which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcing steel against displacement by formwork, construction, or concrete placement operations. Place reinforcing steel to obtain minimum coverages. Arrange, space and securely tie bars and bar supports to hold reinforcing steel in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

2 inches
1 ¹ / ₂ inches
2

- D. Rebar Splices: Locate at points of minimum stress or as shown on contract drawings. Unless noted otherwise, provide lap splices 30 bar diameters (18 inches minimum) in length.
- E. Welded Wire Fabric Splices: Lap one complete wire spacing.
- F. Corner Reinforcing: Provide corner bars of same size and spacing as horizontal reinforcing steel. Lap with horizontal reinforcing 30 bar diameters or 18 inches minimum length.
- G. Reinforcing at Construction/Control Joints: Continue reinforcing steel through construction joints unless noted otherwise. Discontinue reinforcing steel 2 inches from preformed construction joints in slabs-on-grade. Cut alternate longitudinal bars at weakened plane control joints in walls.

END OF SECTION 03_2000

SECTION 03_3000 CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 WORK INCLUDED

This section covers cast-in-place concrete including finishing, surface repair and curing. A.

1.2 **RELATED WORK SPECIFIED ELSEWHERE**

- A. Concrete Forming and Accessories - Section 03_1000
- B. Concrete Reinforcement - Section 03_2000
- C. Under Slab Vapor Retarder - Section 07 2600

1.3 **OUALITY ASSURANCE**

- Reference Standards: Meet the requirements of the following codes, specifications and standards. A.
 - 1. American Concrete Institute (ACI) Publications;

a.	ACI 301-05	Specifications for Structural Concrete for Buildings
b.	ACI 306.1-90	Standard Specification for Cold Weather Concreting
C.	ACI 318-05	Building Code Requirements for Structural Concrete

2. ASTM International (ASTM);

C39M-11a

c.

d.

e.

f.

g.

a.	ASTM C 31/ C31M-10	Standard Practice for Making and Curing Concrete Test Specimens in the Field
b.	ASTM C 33/ C33M-11a	Standard Specification for Concrete Aggregates

- ASTM C 39/ Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- Standard Specification for Ready-Mixed ASTM C 94/ C 94M-11b Concrete
 - Standard Test Method for Resistance to Degradation ASTM C 131-06 of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- ASTM C 136-06 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- ASTM C 143 Standard Test Method for Slump of C 143M-10a Hydraulic Cement Concrete
- h. ASTM C 150/ Standard Specification for Portland Cement C150M-11

i.	ASTM C 171-07	Standard Specification for Sheet Materials for Curing Concrete
j.	ASTM C 172/ C172M-10	Standard Practice for Sampling Freshly Mixed Concrete
k.	ASTM C 173/ C 173M-10b	Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
1.	ASTM C 231/ C231M-10 Method	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure
m.	ASTM C 260/ C260M-10a	Standard Specification for Air Entraining Admixtures for Concrete
n.	ASTM C 309-11	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
0.	ASTM C 330/ 330M-09	Standard Specification for Lightweight Aggregates for Structural Concrete
p.	ASTM C 494/ C 494M-11	Standard Specification for Chemical Admixtures for Concrete
q.	ASTM C 567-05a	Standard Test Method for Determining Density of Structural Lightweight Concrete
r.	ASTM C 618-08a	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
s.	ASTM D 4318-10	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

- B. Environmental Requirements: Manufacturer and Contractor shall conform to Federal, State, and Local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located. Notify A/E in writing if variations to Specifications herein are required.
 - 1. V.O.C. content shall be a maximum 250 (55) gm/liter, unless more stringent codes or laws apply.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and admixtures.
- B. Concrete Mix Design:
 - 1. Submit mix design in accordance with ACI-301, Section 4.
 - 2. Submit with mix design results of laboratory tests performed within previous 6 months indicating aggregates from the proposed source comply with the requirements of ASTM C 33 or C 330 as applicable.

- 3. Submit the proposed area of use for each mix design submitted (footings, stemwalls, slabs, walls, columns, etc.).
- C. Granular Base Course: Submit gradation, plasticity index, and wear information.
- D. Test Reports: Submit copies of test reports for concrete compressive strength, air content, temperature and slump. Submit copies of granular base course test reports.

1.5 QUALITY ASSURANCE

- Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Environmental Requirements: Manufacturer and Contractor shall conform to Federal, State, and Local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located. Notify A/E in writing if variations to Specifications herein are required.
 - 1. V.O.C. content shall be a maximum 250 (55) gm/liter, unless more stringent codes or laws apply.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, low alkali. Use one brand of cement throughout project.
- B. Normal Weight Aggregates: ASTM C 33. Provide aggregates from a single source for exposed concrete.
- C. Water: Potable.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Water Reducing Admixture: ASTM C 494.
- F. Fly-Ash: ASTM C 618, Class F.
- G. Moisture-Retaining Cover: Provide waterproof paper, polyethylene film, or polyethylene-coated burlap meeting the requirements of ASTM C 171.
- H. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound meeting the requirements of ASTM C 309; Type 1-D with fugitive dye for interior concrete and foundations; Type 2, white pigmented, for exposed exterior concrete except exposed exterior Architectural concrete, use Type 1-D.

Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs. Curing compound to be used on integrally colored concrete slabs shall be approved by the manufacturer of the color.

I. Vapor Retarder shall comply with Section 07_2600 of these Specifications.

2.2 **PROPORTIONING AND DESIGN OF MIXES**

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial mixture or field experience methods as specified in ACI 301, Section 4. If trial mixture method is used, employ an independent testing facility, acceptable to Architect, for preparing and reporting proposed mix designs.
- B. Submit written reports to Architect, or Engineer, of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been approved.
- C. Refer to the General Structural Notes for concrete strengths.
- D. Slabs-on-ground or on vapor retarder shall have a water/total cementitious ratio not to exceed 0.45.
- E. Admixtures
 - 1. Use water reducing admixture conforming to ASTM C 494, Type A, in all concrete unless approved otherwise by the Structural Engineer.
 - 2. All other admixtures shall have the written approval of the Architect or Structural Engineer.
 - 3. Calcium chloride is not permitted.
 - 4. All admixtures, except high range water reducers, shall be added to the concrete at the batch plant.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

3.2 PREPARATION

Before placing concrete, clean and roughen surface of previously placed concrete. Clean reinforcing steel. Remove debris, providing clean-outs at bottom of forms when necessary. Moisten surfaces to receive concrete unless otherwise prepared. Remove excess water before placing concrete.

3.3 CONCRETE PLACEMENT

- A. General: Comply with ACI 301.
- B. Place concrete continuously in layers not deeper than 24 inches. Concrete shall not be placed against concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints. Deposit concrete as nearly as practicable to its final location to avoid segregation. Do not use vibrators to transport concrete.
- C. Maintain reinforcing in proper position during concrete placement operations.

- D. Consolidate concrete, immediately after placing, by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
- E. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface. Do not disturb slab surfaces prior to beginning finishing operations.
- F. Cold Weather Concreting: Protect concrete work from physical damage or reduced strength caused by frost, freezing or low temperatures. Comply with ACI 306.1.
- G. Hot Weather Concreting: When hot weather conditions exist that would impair quality and strength of concrete, reduce delivery time of ready mix concrete, lower the temperature of materials, or add retarder to ensure that the concrete is plastic. Retempering with water is not allowed.

3.4 FINISH OF FORMED SURFACES

A. Rough Form Finish: Provide where formed concrete surfaces are not exposed to view. Tie holes and surface imperfections shall be repaired and patched and fins and other projections exceeding ¹/₄ inch in height rubbed down or chipped off.

3.5 FINISH OF HORIZONTAL SURFACES

A. At tops of foundation walls and grade beams finish with a texture matching adjacent formed surfaces unless otherwise indicated.

3.6 SLAB FINISHES

- A. Float Finish: Begin floating when surface water has disappeared and when concrete has stiffened sufficiently to permit operation of power-driven or hand floats. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding ¹/₄ inch in 10 feet when tested with a 10 foot straightedge.
- B. Scratch Finish: Apply scratch finish to slab surfaces that are to receive floor topping. Roughen surface before final set, using stiff brushes, or brooms.
- C. Trowel Finish: Apply trowel finish to all slab surfaces unless noted otherwise. After floating, begin first trowel finish using a power-driven or hand trowel. Finish concrete surface by a final hand-trowel operation, free of trowel marks, and uniform in texture and appearance. The final surface finish for slabs-on-grade shall have a minimum FF = 25 and a minimum FL = 20 per ACI requirements.
- D. Broom Finish: Apply on exterior slabs, ramps, steps, and sidewalks. Immediately after concrete has received a float finish, draw a broom or burlap belt across the surface to give a coarse transverse scored texture.

3.7 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Continue curing for at least 7 days.
- B. Moisture-retaining Cover curing: All interior concrete slabs, except exposed integrally colored concrete slabs, are to be cured with a moisture retaining cover for the first 7 days. After that time, the cover shall be removed and the slab should be allowed to dry. Cover concrete surfaces with

moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed. Repair any holes or tears in cover during curing period.

- C. Curing compound: At contractor's option, exterior concrete slabs may be cured using curing compound. All vertical concrete (walls, beams, etc...) shall be cured using curing compound apply compound to the vertical surface as soon as the forms are removed. Apply curing compound uniformly in accordance with the manufacturer's printed instructions. Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs.
- D. Exposed integrally colored concrete slabs: Use curing compound recommended by the concrete supplier. Apply with and airless sprayer.

3.8 CONCRETE SURFACE REPAIRS

A. Patching Surface Imperfections: Remove loose material and patch surface imperfections and holes left by tie rods with cement mortar. Surface imperfections include honeycomb, excessive air voids, sand streaking and cracks.

3.9 FOR EXPOSED-TO-VIEW SURFACES

A. Blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

3.10 FIELD QUALITY CONTROL

- A. The Owner shall employ the services of a qualified testing laboratory to perform tests and submit test reports.
- B. Sampling Fresh Concrete: ASTM C 172.
- C. Slump: ASTM C 143; one test for each set of compressive strength test specimens.
- D. Air Content: ASTM C 173 or C 231 for each set of compressive strength test specimens.
- E. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below, when 80 degrees F and above; and when compression test specimens are made.
- F. Compression Test Specimen: ASTM C 31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required. Mold one set of standard cylinders for volume of concrete specified below or fraction thereof.

1.	Slabs on Grade	30 cubic yards
2.	Footings and stem walls	50 cubic yards
3.	All other locations (unless noted otherwise)	30 cubic yards

G. Compressive Strength Tests: ASTM C 39; test 1 specimen at 7 days, 2 specimens at 28 days, and retain one specimen in reserve for later testing. Additional Tests: The testing laboratory will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure as directed by the Architect. The testing laboratory may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by the Architect or Engineer. The

Owner shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION 03_3000

SECTION 03_3616 - REACTIVE CHEMICAL CONCRETE STAIN

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Chemically stained concrete floor finish.
 - 2. Sealer.

B. Related Sections:

- 1. Section 03 3000 "Cast-In-Place Concrete" for general concrete applications.
- 2. Section 07 9200 "Joint Sealants" for colored sealant installed in paving joints.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C 171: Standard Specification for Sheet Materials for Curing Concrete.
 - 2. ASTM C 309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 3. ASTM F 1869: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's technical data, including Material Safety Data Sheet (MSDS) and installation instructions, for each product specified.
- B. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.
- C. Qualification Data: For manufacturer and Installer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 10 years of documented experience producing the specified products.
- B. Installer Qualifications: Minimum 5 years of documented experience with work of similar scope and complexity required by this Project and acceptable to, or certified by, concrete stain manufacturer.
- C. Regulatory Requirements:
 - 1. Products to comply with United States Clean Air Act for maximum Volatile Organic compound (VOC) content as specified in this Section.

- D. Material Source: Obtain each specified material from the same source.
- E. Notification: Give a minimum 7 calendar days' notice to manufacturer's authorized field representative before date established for commencement of concrete stain work.
- F. Concrete Stain Mockups:
 - 1. Construct a 10 foot by 10 foot mockup at location selected by Architect.
 - 2. Provide individual mockups for each color and pattern required.
 - 3. Construct mockup using materials, processes, and techniques required for the work, including curing procedures. Incorporate representative control, construction, and expansion joints according to Project requirements. Installer for the work to construct mockup.
 - 4. Mockup to be stained and sealed by the Installer who will actually perform the work for the Project. Record the amount of chemical stain needed per square foot of application to establish coverage rates for the work.
 - 5. Notify Architect and Owner a minimum of seven calendar days in advance of the date scheduled for each mockup construction.
 - 6. Obtain the Architect's and Owner's acceptance of each mockup prior to commencement of the work.
 - 7. Each mockup to remain until completion of the work to serve as a quality control standard for the work. Provide suitable protections to preclude damage to mockup.
 - 8. Demolish and remove each mockup from site when directed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in original factory unopened, undamaged packaging bearing identification of product, manufacturer, batch number, and expiration date as applicable.
- B. Store products in a location protected from damage, construction activity, and adverse environmental conditions, and away from combustible materials and sources of heat, according to manufacturer's printed instructions and current recommendations.
- C. Handle products according to manufacturer's printed instructions.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Maintain an ambient temperature between 50 deg F and 90 deg F during application and at least 48 hours after application.

1.7 PREINSTALLATION CONFERENCE

A. Seven calendar days prior to scheduled date of installation, conduct a meeting at Project site to discuss requirements, including application methods. Attendees to include Architect, Owner, Contractor, Installer, and manufacturer's authorized field representative.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

Basis of Design: Provide products specified herein manufactured by L. M. Scofield Company (Scofield) Α.

LITHOCHROME Chemstain Classic. <u>www.scofield.com</u> Customer service number is (800) 800-9900.

2.2 MATERIALS

- Reactive Chemical Concrete Stain: Reactive, water-based solution of metallic salts which react with A. calcium hydroxide in cured concrete substrates to produce permanent variegated or translucent color effects. Zero VOC content.
 - 1. Product: Scofield's "LITHOCHROME Chemstain Classic."
 - 2. Color(s): To be selected by Architect from full range of colors available.
 - 3 Sealers - choose from one of the following sealers:
 - a.
 - SCOFIELD[®] Cureseal-STM SCOFIELD[®] Curesel-VOCTM SCOFIELD[®] Cureseal-100TM b.
 - c.
 - SCOFIELD[®] Selectseal-WTM d.
 - SCOFIELD[®] Cureseal-WTM e.
 - CEMENTONE[®] Clear Sealer f

PART 3 - EXECUTION

3.1 **EXAMINATION**

- Examine areas and conditions under which the concrete stain work will be performed and identify A. conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.
- Β. Interior Applications: Concrete substrates must have a moisture vapor emission rate of less than 5 lbs./1000 sq. ft. per 24 hour based on a 72 hour test period according to ASTM F 1869.

3.2 PREPARATION

- A. New Concrete: Comply with the following:
 - 1. Newly placed concrete to sufficiently cure for concrete to become reactive. Minimum cure time is 14 days.
 - 2. Interior Applications: Minimum cure time of concrete is 30 to 60 days, or longer if necessary to meet the specified water vapor transmission requirements.
 - 3. Do not use liquid curing materials. Cure concrete flatwork with new, unwrinkled, non-staining, high quality curing paper complying with ASTM C 171. Do not overlap curing paper.
 - 4. Immediately prior to chemically staining, thoroughly clean concrete to remove any contaminants deleterious to subsequent chemical stain application. Sweep surfaces, then pressure wash or scrub using a rotary floor machine with a Mal-Grit Brush from the Malish Corporation. Use suitable,

non-acidic, high quality commercial detergents to facilitate cleaning. Rinse surfaces after cleaning until rinse water is completely clean. Allow floor to dry completely prior to application of concrete stain.

- a. Pressure Washing: Use a pressure washer equipped with a fan tip and rated for a minimum pressure capability of 4000 psi.
- B. Surface Preparation for New or Existing Concrete:
 - 1. Concrete surfaces should be completely penetrable before applying the initial application of chemical stain. The surface of the concrete should be lightly mechanically abraded to remove weak cement paste and contaminants. The final surface preparation should approximate a Concrete Surface Profile of 1, (CSP1 as designated by the International Concrete Repair Institute, Alexandria, Virginia). Methods for mechanical abrasion include:
 - a. Pressure Washing: Use a pressure washer equipped with a fan tip and rated for a minimum pressure capability of 4000 psi.
 - b. Scrubbing with a rotary floor machine with a Mal-Grit Brush from the Malish Corporation.
 - c. Light sanding of the surface.

Surfaces should be tested to receive stain by spotting with water. Water should immediately darken the substrate and be readily absorbed. If water beads and does not penetrate or only penetrates in some areas, perform additional surface preparation and testing. On denser concrete floors, sand lightly to open up surfaces. Retest and continue surface preparation until water spots immediately darken and uniformly penetrate concrete surfaces.

- 2. Rinse concrete substrates until rinse water is completely clean.
- C. Scoring: Score decorative jointing in concrete surfaces 1/8 inch deep with diamond blades. Rinse until water is completely clean.
 - 1. Single Color Stain Applications: Score after staining.
 - 2. Multiple Color Stain Applications: Score before staining.

3.3 CHEMICAL STAIN APPLICATION

- A. General: Comply with chemical stain manufacturer's printed instructions and current recommendations.
 - 1. Do not mix the specified chemical stain with highly alkaline materials. Doing so will result in a dangerous chemical reaction.
- B. Protect surrounding areas, landscaping, and adjacent surfaces from overspray, runoff, and tracking. Divide surfaces into small work sections using walls, joint lines, or other stationary breaks as natural stopping points.
- C. Apply chemical stains at the coverage rate recommended by the manufacturer and use application equipment according to the chemical stain manufacturer's printed instructions. Note the color of the liquid chemical stain will not be the final color produced on the concrete substrate.
- D. Transfer chemical stain to the substrate by brush or spray and immediate scrub into surface. Reaction time depends on wind conditions, temperatures, and humidity levels.
- E. When multiple coats of one or more colors are required, washing and drying between colors is desirable to evaluate the color prior to the next coat.

- F. Rinsing: After the final coat of chemical stain has remained on the surface for a minimum of four hours, neutralize unreacted chemical stain residue and then remove completely prior to sealing. After neutralization, thoroughly rinse surface with clean water several times to remove soluble salts. While rinsing, lightly abrade surface using a low-speed floor machine and red pad to remove residue and weakened surface material. Runoff may stain the adjacent areas or harm plants. Collect rinse water by wet vacuuming or absorbing with an inert material.
 - 1. Failure to completely remove all residue prior to sealing the surface will cause appearance defects, adhesion loss or peeling, reduced durability, and possible bonding failure and delamination of sealer.
 - 2. All stain residue, runoff liquid, and rinse water must be collected and disposed of according to applicable Federal regulations and governing authorities having jurisdiction.

3.4 SEALING APPLICATION

- A. Concrete substrate must be completely dry. Test surface for proper pH prior to applying sealer. A pH value of 7 or higher indicates all acid has been neutralized. If the tested pH value is less than 7, repeat neutralization step until the required pH value is achieved.
- B. Conduct a moisture vapor emission test prior to applying any sealer. Refer to the specific sealer's Technical-Data Bulletin for acceptable MVER.
- C. Apply sealer according the sealer manufacturer's printed instructions at a rate of 300 to 500 square feet per gallon per coat. Maintain a wet edge at all times.
- D. Allow sealer to completely dry before applying additional coats.
- E. Apply second coat of sealer at 90 degrees to the direction of the first coat using the same application method and rates.
- F. Seal horizontal joints in areas subject to pedestrian or vehicular traffic.

3.5 **PROTECTION**

- A. The General Contractor is responsible for using Temporary Floor Protection throughout the project to safeguard the surface quality of concrete slabs before and after application of decorative finishes or installations of other materials.
- B. All concrete floors that will be not be covered by other materials will be protected throughout the project. The concrete slab must be treated as a finished floor at all times during construction.
- C. Temporary Floor Protection will be removed only while finish work to the concrete is being performed and will be replaced after the final finish has cured sufficiently.
- D. Temporary Floor Protection will be Proguard Duracover as manufactured by L. M. Scofield Company, Douglasville, GA (800-800-9900). Seaming of the temporary floor protection will be performed with Scofield Proguard Heavy Duty Seaming Tape. Both products will be installed following the manufacturer's published installation procedures.
- E. DO NOT APPLY THE HEAVY DUTY SEAMING TAPE TO BARE OR FINISHED FLOORS OR WALL SURFACES AT ANY TIME. IT WILL PERMANENTLY DAMAGE THE FLOOR

F. No substitutions will be allowed.

3.6 MAINTENANCE

A. Maintain chemically stained and sealed floors by sweeping. Clean spills when they occur and rinse dirt off with water. Wet-clean heavily soiled areas by mopping or by scrubbing with a rotary floor machine equipped with a scrubbing brush and a suitable, high quality commercial detergent. Maintain interior floors that require polishing by using a compatible, premium-grade, emulsion-type, commercial floor polish, according to manufacturer's printed instructions and safety requirements.

END OF SECTION 03_3616

SECTION 03_5413 - GYPSUM CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes gypsum-cement-based, self-leveling underlayment for application below interior floor coverings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.
- B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.

PART 2 - PRODUCTS

2.1 GYPSUM-CEMENT-BASED UNDERLAYMENTS

- A. Underlayment: Gypsum-cement-based, self-leveling product that can be applied in minimum uniform thickness of 1/8 inch (3 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Ardex</u>; GS-4 Self-Leveling Repair Underlayment
 - b. <u>Conspec by Dayton Superior; Conflow Supreme</u>.
 - c. <u>Maxxon Corporation</u>; Gyp-Crete USG Corporation; Levelrock 2500
 - 2. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C 219.
 - 3. Compressive Strength: Not less than 2000 psi (13.8 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch ; or coarse sand as recommended by underlayment manufacturer.

- 1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 deg F.
- D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
 - 1. Primer shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D.
 - 2. Primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 **PREPARATION**

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove laitance, glaze, efflorescence, curing compounds, formrelease agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
 - 1. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
- C. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces.
- D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment.

3.2 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - 2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
 - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, level surface.
 - 1. Apply a final layer without aggregate to product surface.

- 2. Feather edges to match adjacent floor elevations.
- D. Cure underlayment. Prevent contamination during application and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

END OF SECTION 03_5413

DIVISION 04 – MASONRY

SECTION 04_2200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Mortar and grout.
 - 3. Steel reinforcing bars.
 - 4. Masonry joint reinforcement.
 - 5. Ties and anchors.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:

- 1. Masonry units.
 - a. Include data on material properties
- 2. Cementitious materials. Include brand, type, and name of manufacturer.
- 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
- 4. Grout mixes. Include description of type and proportions of ingredients.
- 5. Reinforcing bars.
- 6. Joint reinforcement.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.

1.7 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

1.9 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
 - 2. Density Classification: Normal weight.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 4. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91.
- E. Mortar Cement: ASTM C 1329.
- F. Aggregate for Mortar: ASTM C 144.
- G. Aggregate for Grout: ASTM C 404.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- I. Water: Potable.

2.3 **REINFORCEMENT**

- A. Uncoated Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60.
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 1. Exterior Walls: Hot-dip galvanized, carbon steel.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.4 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, waterrepellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. For reinforced masonry, use masonry cement or mortar cement mortar.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 1. For reinforced masonry, use Type S.
- D. Grout for Unit Masonry: Comply with ASTM C 476.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that foundations are within tolerances specified.
 - 2. Verify that reinforcing dowels are properly placed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

- 2. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
- B. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
- B. Provide continuity at corners by using prefabricated L-shaped units.
- C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, and other special conditions.

3.6 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.7 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches in each dimension.
 - 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
 - 3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.
END OF SECTION 04_2200

DIVISION 05 – METALS

SECTION 05_0500 – SHOP APPLIED FINISHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes finishes of architectural exposed structural steel, metal stairs, and metal fabrications as follows:
 - 1. Cleaning metal.
 - 2. Removing corrosion.
 - 3. Removing paint and priming for repainting.
 - 4. Stabilizing and protecting metal.
 - 5. Finishing patina of fabricated steel in the shop
 - 6. Refinishing/touch-up of metal in place.
- B. Related Sections:
 - 1. Division 05 Section 05_1213 Architectural Exposed Structural Steel
 - 2. Division 05 Section 05_5100 Metal Stairs
 - 3. Division 05 Section 05_5000 Metal Fabrications

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- B. Samples for Initial Selection: For the following:
 - 1. Each type of decorative metal item and component with factory-applied or shop built-up patina color finishes.
 - 2. Include similar Samples of accessories involving color selection.
 - 3. Provide one sample of same size and shape for each type of finish, or if proposing alternative finish to products under paragraph 2.5 this section provide sample of each for comparison.
- C. Samples for Verification: For the following items in sizes indicated, finished as required for use in the Work:
 - 1. Fittings and brackets.
 - 2. Each type of exposed connection between components. Show method of finishing components at intersections.
 - 3. Each type of exposed finish prepared on metal of the same alloy to be used for the Work of this Section; 6 inches (150 mm) long in least dimension.
 - 4. Sealant Materials: See Division 07 Section "Joint Sealants."
 - 5. Accessories: Each type of anchor, accessory, and miscellaneous support in required finishes.

- D. Product extras
 - 1. At end of project, submit minimum one gallon each of two part sealer in properly labeled air-tight containers with instructions printed clearly on outside of container for owner re-coat and touch up use.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Pack, deliver, and store decorative metal items in suitable packs, heavy-duty cartons, or wooden crates; surround with sufficient packing material to ensure that products will not be deformed, cracked, or otherwise damaged.
- B. Store decorative metal inside a well-ventilated area, away from uncured concrete and masonry and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.
- C. Protect strippable protective covering on decorative metal from exposure to sunlight and high humidity, except to the extent necessary for the period of decorative metal installation.

1.5 PROJECT CONDITIONS

A. Storage, in-place touch up of chemical applications and patinas shall be performed only when the school site is vacant or the owner has been notified of the products to be used and the time for work to take place two-weeks in advance.

1.6 EXTRA MATERIALS

1. Furnish extra touch-up materials to owner in labeled, dated containers with instruction printed directly on the container.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

- A. Manufacturers of Chemical Cleaners: Subject to compliance with requirements, provide products by one of the following:
 - 1. Back to Nature Products Company.
 - 2. Dumond Chemicals, Inc.
 - 3. Hydroclean; Hydrochemical Techniques, Inc.
 - 4. PROSOCO, Inc.
- B. Water: Potable.
- C. Hot Water: Water heated to a temperature of 140 to 160 deg F (60 to 71 deg C).
- D. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium polyphosphate, 1/2 cup (125 mL) of laundry detergent, 5 quarts (5 L) of 5 percent sodium hypochlorite bleach, and 15 quarts (15 L) of hot water for every 5 gal. (20 L) of solution required.

- E. Nonacidic Liquid Chemical Cleaner: Manufacturer's standard mildly alkaline liquid cleaner, formulated for removing organic soiling from ordinary building materials including polished stone, brick, copper, brass, bronze, aluminum, stainless steel, plastics, wood, and glass.
- F. Abrasive Materials:
 - 1. Abrasive Pads for Copper-Alloy Cleaning: Extra fine bronze wool or plastic abrasive pads.
 - 2. Blasting Abrasive: Pulverized walnut shells
 - 3. Abrasives for Ferrous Metal Cleaning: Aluminum oxide paper, emery paper, fine steel wool, steel scrapers, and steel-wire brushes of various sizes.

2.2 PAINT REMOVERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - 1. ABR Products, Inc.
 - 2. Back to Nature Products Company.
 - 3. Cathedral Stone Products, Inc.
 - 4. Dumond Chemicals, Inc.
 - 5. Hydroclean; Hydrochemical Techniques, Inc.
 - 6. PROSOCO, Inc.
- B. Alkaline-Paste Paint Remover: Manufacturer's standard alkaline-paste formulation for removing paint from metals.
- C. Covered or Skin-Forming Alkaline Paint Remover: Manufacturer's standard covered or skin-forming alkaline formulation for removing paint from metal.
- D. Solvent-Type Paint Remover: Manufacturer's standard water-rinsable, solvent-type gel formulation for removing paint from metals.
- E. Low-Odor, Solvent-Type Paint Remover: Manufacturer's standard low-odor, water-rinsable solvent-type gel formulation, containing no methanol or methylene chloride, for removing paint from metals.

2.3 PROTECTIVE COATING MATERIALS

A. Products: Subject to compliance with requirements, provide one of the following
 a. Paint Sealer made from 50% boiled linseed oil and 50% tongue oil

2.4 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 STEEL FINISHES

- A. Patina Finish: mild acid applied at the shop over several cycles of etching and drying while exposed to the exterior environment.
 - 1. Following final acid treatment, apply neutralizing agent over all treated surfaces and prepare for protective coat
- B. EasyRust Ornamental Rust Finish1) Medium color for steel applications
- C. EasyBlue Ornamental Bluing Finish1. Room temperature chemical bluing treatment for steel applications.

PART 3 - EXECUTION

3.1 **PREPARATION**

- A. For field touch-ups, comply with chemical-product manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. For all Patina processes prevent chemical solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
 - 1. Cover adjacent surfaces with materials that are proven to resist chemical solutions being used unless the solutions will not damage adjacent surfaces. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 - 2. Keep wall wet below area being treated to prevent streaking from runoff.
 - 3. Do not apply chemical solutions during winds of sufficient force to spread them to unprotected surfaces.
 - 4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 - 5. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.2 CLEANING

- A. General: Use only those methods indicated for each type of decorative metal. Apply materials to all surfaces, corners, contours, and interstices, to provide a uniform final appearance without streaks. After work is complete, remove protection no longer required. Remove tape and adhesive marks.
 - 1. Clean all markings, labels, foundary notations completely from exposed steel components using blast abrasion and cleaning agents, assure that all exposed faces of steel components are left with a uniform texture/appearance after final cleaning and inspection, prior to patina process.
 - 2. Assure that all mill scale has been removed and only bare metal is exposed all surfaces.
 - a. If scouring, or mechanically brushing/scraping is required, final surface of all steel components must match uniformly.
 - 3. If using EasyRust type product, all components shall be pre-cleaned with mild detergents and a mild acid solution and neutralized prior to application in order to remove all oil.

3.3 PATINA

A. For acid patina:

- 1. Apply dilute acid solution over all surfaces of components, allow to stand exposed to exterior environment on all sides, lightly abrade or blast all surfaces and re-apply acid solution to etch the surface of all components uniformly, repeat several times.
 - a. Architect shall verify final etching prior to protective coating.
- B. For EasyRust Ornamental Rust Finish
 - 1. Follow all manufacturers recommended application procedures.
 - a. Spray apply product over entire surface with even, uniform movement until product color appears, do not apply multiple coats, do not rinse off residual product.
 - b. Allow components to air dry, place in high humidity environment and mist continuously with fresh potable water. Allow to rust until sufficient patina is achieved.
 - 1) Rinse product off components to stop the process, spray with ReactArrest or manufacturer provided neutralizer and allow to dry. Architect shall approve final appearance prior to protective coating.
- C. For EasyBlue Ornamental Bluing Finish
 - 1. Follow all manufacturers recommended application procedures.
 - a. Wear latex gloves when hankdling the cleaned part as even finger oils will inhibit darkening.
 - b. Immerse object to receive patina in the solution and agiate until an even degree of darkening is achieved.
 - c. After immersion, reinse the darkened part in water to remove the excess solution and then dry. A layer of fine, dark rust will form. Remove rust with a burnishing wheel of soft cloth. Immerse part again to further darken the metal. Repeat this process until Architect/Owner approve of finish. Two or three applications may be required.
 - d. Spray with ReactArrest or manufacturer provided neutralizer and allow to dry. Architect shall approve final appearance prior to protective coating.
- D. Patina Schedule:
 - 1. Exterior Architectural Exposed Structural Steel (portal columns, beams, and exposed steel framing): Provide EasyRust Ornamental Rust Finish and two coats of clear sealer.
 - 2. Interior Architecturally Exposed Steel stair (including railings, stringers, and metal mesh) at front Lobby: Provide EasyBlue Ornamental Bluing Finish and two coats of clear sealer.

3.4 PROTECTIVE COATING

A. Spray apply sealer light coat evenly over all surfaces of steel components, let dry completely and lightly rub first coat with steel wool to smooth overspray and texture, apply second spray coat uniformly and air dry.

END OF SECTION 05_0500

SECTION 05_1000 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section includes the fabrication and erection of structural steel.

1.3 QUALITY ASSURANCE

- A. Qualifications of Fabricator: Fabricator shall have a minimum of 5 years experience in the fabrication of structural steel of structures of similar size.
- B. Qualifications of Erector: Erector shall have a minimum of 5 years experience in the erection of structural steel of structures of similar size.
- C. Qualifications of Field Welders: Welders shall be certified in accordance with AWS D1.1 within the last 12 months.
- D. Reference Standards:
 - 1. ASTM International (ASTM)

a.	ASTM A 36/ A36M-08	Standard Specification for Carbon Structural Steel
b.	ASTM A 53/ A 53M-10	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless
c.	ASTM A 61/ A6M-11	Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
d.	ASTM A 307-10	Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
e.	ASTM A 325-10	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
f.	ASTM A 490-11	Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
g.	ASTM A 500/ A500M-10a	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
h.	ASTM A 992/ A 992M-11	Standard Specification for Structural Steel Shapes
i.	ASTM C 1107/ C1107M-11	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (non-shrink)
j.	ASTM F1554-07ae1	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

2. American Welding Society (AWS), latest edition.

- a. AWS D1.1 Structural Welding Code-Steel
- 3. American Institute of Steel Construction (AISC), Steel Construction Manual, latest edition.
 - a. Specification for Structural Steel Buildings
 - b. AISC Code of Standard Practice
 - c. Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.

1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings including complete details and schedules for fabrication and assembly of structural steel members. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Shop drawings shall not be made by reproduction of the Contract Drawings.
- B. Provide setting drawings and directions for installation of anchor bolts and other anchorages to be installed by others.
- C. Welder Certification: Submit affidavit stating that all welders are certified in accordance with AWS and provide copies of welder's certificates.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Support structural steel above ground on skids, pallets, platforms, or other supports.
- B. Protect steel from damage.
- C. Store packaged materials in original unbroken package or container.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.
- E. Replace damaged shapes or members.
- F. Waste Management and Disposal; As specified in Division 01 Section "Construction Waste Management" and as follows: Collect cut offs and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All Angles, Channels, Plates, and Bars: ASTM A 36.
- B. Rectangular or Square Hollow Structural Section: ASTM A 500, Grade B, Fy = 46 ksi.
- C. Anchor Bolts: ASTM F1554, Grade 36
- D. High Strength Tension Control Threaded Fasteners: Meet requirements of ASTM A 325 or ASTM A 490.
- E. Headed Anchor Shear Studs: By the Nelson Division of TRW.
- F. Welding Electrodes: E 70 Series.

- G. Shop Primer Paint: Fabricators standard rust inhibitive primer.
- H. Non-Metallic, Non-Shrink Grout: Meets the requirements of ASTM C 1107.
- I. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time. Grout shall have a minimum 28 day compressive strength of 6,000 psi.
 - 1. Subject to compliance with requirements, provide products by one of the following or an approved equal:
 - a. Five Star Fluid Grout 100; Five Star Products, Inc., Fairfield, Connecticut.
 - b. Crystex; L&M Construction Chemicals, Inc. Omaha, Nebraska.
 - c. Sure-Grip High Performance Grout; Dayton superior Corp., Miamisburg, Ohio.
 - d. Sonnogrout 10K; Sonneborn Building Products, Shakopee, Minnesota.
 - e. Sealight Pac-It Grout; W.R. Meadows, Inc., Hampshire, Illinois.
 - f. Enduro 50; Conspec Marketing & Manufacturing Co., Inc, Kansas City, Kansas.

2.2 FABRICATION

- A. Fabrication shall be in accordance with the AISC "Code of Standard Practice for Buildings and Bridges".
- B. Connections: Weld or bolt shop connections as indicated on the approved shop drawings. Design connections to support reactions and forces where indicated on the drawings.
- C. Shop Welds: Shall be visually inspected by the Fabricator's quality control department.

2.3 SHOP PAINTING

- A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete, mortar or to receive sprayed on fireproofing. Paint embedded steel, which is partially exposed on exposed portions and initial 2 inch of embedded areas only.
- B. Do not paint surfaces, which are to be welded or high-strength bolted with friction-type connections.
- C. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
 - 1. SP-1 "Solvent Cleaning"
 - 2. SP-2 "Hand Tool Cleaning"
 - 3. [SP-3 "Power Tool Cleaning". For Architecturally Exposed Structural Steel, AESS, see Architectural drawings for locations.]
- D. Painting: After surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions. Provide one coat.

3.1 COORDINATION

- A. Field Measurements: Verify all elevations, locations, and dimensions of surfaces to receive structural steel.
- B. Anchor Bolts and Other Embedded Items: Verify locations and positions of anchor bolts and other embedded items used to support structural steel.

All Anchor bolts for column base plates, anchors and bearing plates for beams shall be located prior to installation by a Registered Professional surveyor. The Professional Surveyor shall use project control points, such as bench marks, grid lines, or building corners established and accurately maintained by the General Contractor for vertical and horizontal control of location. Templates shall be used to locate groupings of bolts or anchors and shall be confirmed as to orientation and hole geometry accuracy.

Anchor bolts and bearing plates with anchors shall be stabilized against movement, vertical and horizontal, prior to and during concrete casting of concrete supporting these devices.

Upon completion of the concrete casting the Professional Surveyor shall verify vertical and horizontal locations and orientation of anchor bolts or bearing plates with anchors. A report shall be furnished the Engineer of Record (through the General Contractor and Architect) noting non compliant locations. The EOR, will furnish remedial actions required to correct the non compliant anchor bolt or bearing plate locations. Allow ten days for the EOR's report on remedial actions necessary.

It shall be the General Contractor's responsibility to have this work performed.

C. Correct any unsatisfactory conditions prior to erection of structural steel.

3.2 PREPARATION

B. Clean surfaces to receive structural steel prior to erection.

3.3 ERECTION

- A. General: Erect structural steel in accordance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
- B. Field Assembly: Assemble structural steel accurately to the lines and elevations shown on the drawings. Align and adjust components accurately before fastening.
- C. Temporary Bracing: Provide temporary bracing or guys to secure structural steel against wind, seismic, or construction loads. It is the responsibility of the Contractor to maintain stability of the structure during erection.
- D. Field Bolted Connections: Install high strength tension control bolts in accordance with AISC Specifications for Structural Joints Using ASTM A325 and A490 Bolts and the manufacturer's instructions. Where clearance within a connection does not permit the use of tension control bolts, standard A325 bolts shall be used and inspected in accordance with the AISC Specification for Structural Joints.
- E. Field Welding: Perform all welds in accordance with AWS.

- F. Inspection of Field Welds: Perform visual inspection of all field welds. If any welds appear to be unsatisfactory, they shall be tested in accordance with ASTM E160 and/or replaced at the expense of the Contractor.
- G. Gas Cutting: Do not use gas-cutting torches in field to cut structural framing.
- H. Do not enlarge unfair holes by burning. Ream holes that must be enlarged to admit bolts.
- I. Field Touch-up Painting (Primer): Paint all exterior exposed bolts, washers, and nuts after connections have been tightened and checked. Paint all exterior exposed field welds. Paint all exterior exposed abrasions in shop coat. Use same paint as for shop painting.
- J. Grout Placement: Comply with the manufacturer's instructions.
- K. Tighten anchor bolts after supported members have been positioned and plumbed.

END OF SECTION 05_1000

SECTION 05 5000 - METAL FABRICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Definition: Metal fabrications include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of metal systems specified elsewhere.
- B. Extent of metal fabrication is indicated on the Drawings and schedules.
- C. Types of work in this section include metal fabrications for:
 - 1. Rough hardware.
 - 2. Metal Bollards.
 - 3. Steel supports for countertops.
 - 4. Steel framing and supports for mechanical and electrical equipment
 - 5. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 6. Loose bearing and leveling plates
 - 7. Steel weld plates and angles for casting into concrete not specified in other Sections.
 - 8. Steel Fences & Gates
 - 9. Metal ladders
- D. Structural steel is specified in another section within Division 5.

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. American Institute for Steel Construction (AISC)
 - a. Work shall conform to the AISC Manual of Steel Construction and the Code of Standard Practice for Steel Buildings and Bridges, except as modified by deleting the following sentence: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any connection designed by the fabricator in preparation of the shop drawings".
 - 2. ASTM International

	ASTM A 27	Standard Specification for Steel
a.	ASTIVI A 27	Standard Specification for Steel
	A 27M-05	Castings, Carbon, for General Application
b.	ASTM A 36/	Standard Specification for Carbon-
	A36M-05	Structural Steel
c.	ASTM A 47/	Standard Specification for Ferritic Malleable
	A 47M-99	Iron Castings
d.	ASTM A 53/	Standard Specification for Pipe, Steel, Black
	A 53M-01	and Hot-Dipped, Zinc-coated Welded and Seamless
e.	ASTM A 153/	Standard specification for Zinc
	A 153M-01a	Coating (Hot-Dip) on Iron and Steel Hardware
f.	ASTM A 283/	Standard Specification for Low and
	A 283M-00	Intermediate Tensile Strength Carbon Steel Plates
g.	ASTM A 307-00	Standard Specification for Carbon Steel Bolts and
-		Studs, 60 000 PSI Tensile Strength

h.	ASTM A 501-01	Standard Specification for Hot-Formed Welded and
		Seamless Carbon Steel Structural Tubing
i.	A 1008/	Standard Specification for Steel, Sheet,
j.	A 1008M-01a	Cold-Rolled, Carbon, Structural, High-Strength Low
		Alloy and High-Strength Low Alloy with Improved
		Formability
k.	ASTM A 1011/	Standard Specification for Steel, Sheet and
	A 1011M-01a	Strip, Hot Rolled, Carbon, Structural, High-Strength
		Low-Alloy and High-Strength Low Alloy with
		Improved Formability
1.	ASTM E 935-00	Standard Test Methods for Performance of
		Permanent Metal Railing Systems and Rails for
		Buildings

- B. Take field measurements prior to the preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. Allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work. Coordinate measurements prior to the preparation of shop drawings and fabrication to ensure proper fitting of the work.
- C. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- D. Qualifications for Welding Work: Use welding processes and welding operations which qualify with AWS "Standard Qualification Procedure".

1.03 SYSTEM PERFORMANCES

- A. Structural Performances: Provide assemblies which, when installed, comply with the following minimum requirements for structural performance, unless otherwise indicated
- B. Provide handrails capable of withstanding the following loads applied as indicated when tested per ASTM E 935.
 - 1. Concentrated loads of 200 lbs. applied at any point in any direction.
 - 2. Uniform load of 50 lbs. per linear ft. applied simultaneously in both vertical and horizontal directions.
 - 3. Concentrated and uniform loads above need not be assumed to act concurrently.
- C. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

1.04 SUBMITTALS

- А.
- 1. Catalog Data: Submit manufacturer's catalog data, specifications, and anchor details for products used in miscellaneous metal fabrications, including paint products and grout.
- 2. Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Furnish templates for anchor bolt installation.
- 3. Where materials or fabrications are to comply with stated requirements for design loading, include structural computations, material properties and other information used in structural analysis.

- B. Waste Management and Disposal: As specified in Division 01 Section "Construction Waste Management" and as follows:
 - 1. Collect off cuts and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Waste Management: Collect off cuts and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Metals:
 - 1. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
 - 2. Use steel plates, shapes and bars complying with ASTM A 36.
 - 3. Use bent or cold formed steel plates complying with ASTM A 283, Grade C.
 - 4. Use steel bars and bar-size shapes complying with ASTM A 36.
 - 5. Use hot-rolled steel tubing complying with ASTM A 501.
 - 6. Use hot-rolled structural steel sheet complying with ASTM A 1011, Grade 33; or use cold-rolled complying with ASTM A 1008, Class 1; or grade required for design loading.
 - 7. Use steel pipe complying with ASTM A 53, Type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (schedule 40), unless otherwise indicated.
 - 8. Use cold finished steel bars complying with ASTM A 108, Grade as selected by fabricator.
 - 9. Use cold rolled carbon steel sheets complying with ASTM A 1008.
 - 10. Use cast or formed metal brackets, flanges and anchors of the same type material and finish as supported rails, unless otherwise indicated.
 - 11. Use threaded or wedge type concrete inserts with galvanized ferrous casting, either malleable iron complying with ASTM A 47 or cast steel complying with ASTM A 27. Furnish and install hot-dip galvanized bolts, washers and shims as required to comply with ASTM A 153.

B. Fasteners:

- 1. General: Furnish and install zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
- 2. Use regular hexagon head type anchor bolts and nuts, ASTM A 307, Grade A.
- 3. Use square head type lag bolts, FS FF-B-561.
- 4. Use cadmium plated steel machine screws, FS FF-S-92.
- 5. Use flat head carbon steel wood screws, FS FF-S-111.
- 6. Use round plain carbon steel washers, FS FF-W-92.
- 7. Use anchors conforming to the following requirements:

- a. Use threaded type concrete inserts with galvanized ferrous castings, internally threaded to receive ³/₄ inch diameter machine bolts; either malleable iron complying with ASTM A 47, or cast steel complying with ASTM A 27 hot-dip galvanized complying with ASTM A 153.
- 8. Use helical spring type carbon steel lock washers, FS FF-W-84.

C. Paint:

- 1. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Division 9.
- 2. Use high zinc dust content paint for regalvanizing welds in galvanized steel, complying with the Military Specifications MIL-P-21035 (Ships) or SSPC-Paint-20.

2.02 FABRICATION, GENERAL

- A. Workmanship: Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in the finished product for use intended. Use type of materials indicated or specified for various components of work.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise indicated. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing work.
- C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts.
- E. Provide for anchorage of the type shown and required to support the structure either as shown on the Drawings or for temporary or permanent erection. Fabrication and spacing of anchoring devices shall provide adequate support for their intended use.
- F. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- G. Use hot-rolled steel bars for work fabricated from bar stock, unless work is indicated to be fabricated from cold finished or cold-rolled stock.
- H. Galvanizing: Provide a zinc coating for those items shown or specified to be galvanized, as follows:
 - 1. ASTM A 153 for galvanizing iron and steel hardware.
 - 2. ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8 inch thick and heavier.
- I. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

- J. Apply shop primer to surfaces of metal fabrication except those which are galvanized or indicated to be embedded in concrete or masonry, unless otherwise indicated, and in compliance with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.
- K. Surface Preparation: Prepare ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications.
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning".
 - 2. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning".

2.03 ROUGH HARDWARE

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division-6 sections.
- B. Fabricate items to sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.04 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.05 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.
- B. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise indicated, fabricate from structural steel shapes and plates and steel bars of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
- C. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
 - 1. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units of 1- ¹/₄ inch X ¹/₄ inch X 8 inch steel straps.
- D. Galvanize miscellaneous frames and supports where indicated.

2.06 MISCELLANEOUS STEEL TRIM

METAL FABRICATIONS

A. Provide shapes and sections indicated for profiles shown. Unless otherwise indicated fabricate units from structural steel shapes, plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.

PART 3 - EXECUTION

3.01 **PREPARATION**

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.02 INSTALLATION

- A. General:
 - 1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, through-bolts, wood screws and other connectors as required.
 - 2. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete or similar construction.
 - 3. Fit exposed connections accurately together to form tight hairline joints. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
 - 4. Field welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.
 - 5. Setting Loose Plates: Clean concrete bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
 - 6. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut-off flush with the edge of the bearing plate before packing with grout. Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic non-shrink grout in exposed locations, unless otherwise indicated.
 - a. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.03 ADJUST AND CLEAN

METAL FABRICATIONS

- A. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections and abraded areas of the shop paint on miscellaneous metal is specified in a section within Division 9.
- B. For galvanized surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 05_5000

SECTION 05_5100 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Ornamental steel-framed stairs with concrete-filled treads.
- 2. Steel tube railings attached to metal stairs.
- 3. Steel tube handrails attached to walls adjacent to metal stairs.

B. Related Sections:

- 1. Section 03_3000 "Cast-in-Place Concrete" for concrete fill for stair treads and platforms receiving vinyl/rubber treads and flooring.
- 2. Section 03_3300 "Architectural Concrete" for concrete fill of stair treads and platforms exposed to view.
- 3. Section 05 0500 "Shop Applied Finishes" for chemical patina applied to Lobby Stair elements.
- 4. Section 05_5000 "Metal Fabrications" for roof access ladders.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - 1. Uniform Load: 100 lbf/sq. ft..
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 inch, whichever is less.
- C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.

- 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.

1.4 ACTION SUBMITTALS

- A. Product Data: For metal stairs and the following:
 - 1. Abrasive nosings.
 - 2. Patina products specified in Div 05 "Shop Applied Finishes".
 - 3. Aggregates, sand, and white Portland cement specified in Div 03 "Architectural Concrete"
 - 4. Grout.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes:
 1. Stair tread nonslip inserts.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
 - 1. Ornamental Stairs: Architectural class.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."

1.6 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
- D. Coordinate requirements or Architecturally Exposed Structural Steel and Shop Applied Finishes.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

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

2.2 FERROUS METALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [25] <Insert number> percent.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- F. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.

2.3 ABRASIVE TREAD INSERTS

- A. Cast-Metal Units: Cast aluminum, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit treads.
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Safety Tread Co., Inc.
 - b. Balco Inc.
 - c. <u>Barry Pattern & Foundry Co., Inc</u>.
 - d. <u>Granite State Casting Co</u>.
 - e. <u>Safe-T-Metal Company, Inc</u>.
 - f. <u>Wooster Products Inc</u>.
 - 2. Configuration: Cross-hatched units, 3 inches wide without lip.
- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- C. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.
- D. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.4 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Finish of all exposed fasteners at Lobby Stair (EasyBlue Patina) shall match the finish of the exposed AESS elements of the stair assembly.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Primers: Provide primers that comply with Section 09 9000 "Painting".
- D. Lobby Stair: Delete primer and follow specifications for Div. 05 "Shop Applied Finishes".
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete Materials and Properties: Comply with requirements in Section 03_3000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - 1. Reference Section 03 "Architectural Concrete" for exposed concrete treads and landings at the Lobby stair.
- H. Welded Wire Fabric: ASTM A 185/A 185M, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.

2.6 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
 - 3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
- B. Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
- H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.7 STEEL-FRAMED STAIRS

- A. Stair Framing:
 - 1. Fabricate stringers of steel tubes.
 - a. Provide closures for exposed ends of tube stringers.
 - 2. Construct platforms of steel plate or channel/tube headers and miscellaneous framing members as needed to comply with performance requirements indicated.
 - 3. Weld stringers to headers; weld framing members to stringers and headers.
- B. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch.
 - 1. Steel Sheet: Uncoated cold]-rolled steel sheet unless otherwise indicated.
 - 2. Steel Sheet: Galvanized-steel sheet, at exterior stairs.
 - 3. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
 - 4. Shape metal pans to include nosing integral with riser.
 - 5. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

2.8 STAIR RAILINGS

- A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
 - 1. Rails and Posts: 2-inch x 3/8" bar stock top and bottom rails and 2-inch- square posts.
 - 2. Mesh Infill: Woven wire mesh crimped into 1-by-1/2-by-1/8-inch steel channel frames. Orient wire mesh with wires horizontal and vertical.

- B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
- C. Form changes in direction of railings as follows:1. By flush bends or by inserting prefabricated flush-elbow fittings.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
 - 1. Connect posts to stair framing by direct welding unless otherwise indicated.
 - 2. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrousmetal components.
 - 3. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
- H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.9 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 - 2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning
- E. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

- 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- 2.10 Delete Shop Priming at Lobby Stair to receive Shop Applied Finish (EasyBlue Chemically applied patina).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- G. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."
 - 1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.
- H. Place and finish concrete fill for treads and platforms of Lobby Stair per Section "Architetural Concrete".

3.2 INSTALLING RAILINGS

- A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:
 - 1. Anchor posts to steel by welding directly to steel supporting members.
- B. Attach handrails to wall with wall brackets. Use type of bracket with predrilled hole for exposed bolt anchorage. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction [as required to comply with performance requirements.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099000 Painting"
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
- C. Patina Surfaces: Touch up in field per Section "Shop Applied Finishes'.

END OF SECTION 05_5100

DIVISION 06 – WOOD & PLASTIC

SECTION 06_1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Furnish and install all beams, structural plywood, blocking, supports, non-structural nailers, and stripping as required for securing other work, shown on Drawings. Furnish all hardware, miscellaneous rough carpentry and related accessories as indicated on the Drawings or specified herein for a complete installation.

1.2 QUALITY ASSURANCE

- A. Codes and Standards: All lumber shall conform to all requirements of the International Building Code. All framing lumber and plywood shall be appropriately grade marked with an agency certified by the American Lumber Standards Committee Board of Review for lumber or the American Plywood Association for plywood.
- B. Coordination: Contractor shall coordinate location of blocking with other related trades. Other Contractors will furnish exact locations of grounds and blockings to this Contractor for proper installation of their Work.

1.3 SUBMITTALS

- A. Product Data: Submit copies of manufacturer's product data indicating specifications and installation requirements for rough hardware items specified, i.e., connectors, joist hangers, etc.
- B. Letters: Submit letter of compliance that all lumber is grade-marked in compliance with specified products and that lumber is of species and fiber stress specified.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber:
 - 1. Hem-Fir or Douglas Fir: Non-structural furring, concealed blocking and stripping, and miscellaneous nailers, grade marked with WWPA stamp.
- B. Framing Lumber:
 - 1. Studs, sills, plates, ledgers, stiffeners, bridging, etc. Size and spacing as indicated and as required, shall be:

Species: Spruce-Pine-Fir: Grade No. 2 or better

Fb =	875 psi
Ft =	450 psi
Fv =	135 psi
Fc =	425 psi perpendicular to grain
Fc =	1150 psi parallel to grain
Ec =	1,400,000 psi

2. Wood members 2" to 4" thick, 5" and wider.

Species: Hem-Fir: Grade No. 2 or better

Fb =	850 psi
Ft =	525 psi
Fv =	150 psi
Fc =	405 psi perpendicular to grain
Fc =	1300 psi parallel to grain
Ec =	1,300,000 psi

3. Beam and Stringers.

Species: Douglas Fir: Grade No. 1 or better

Fb =	1300 psi
Ft =	450 psi
Fv =	165 psi
Fc =	850 psi perpendicular to grain
Fc =	575 psi parallel to grain
Ec =	1,300,000 psi

C. Plywood:

1. Floor Sheathing: APA Structural I, exterior 3/4" thick. Span rating not less than 48/24.

D. Fasteners:

- 1. Nails: Meeting the requirements of ASTM F1667
 - a. Common wire nails. Use galvanized box nails where rough carpentry is exposed to moisture.
 - b. Non-corrosive finish nails of either stainless steel, aluminum or high quality hotdipped galvanized shall be used on all exposed decorative lumber and redwood flooring.
- 2. Bolts: ASTM A307-94 "Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength," galvanized for exterior connections. Use washers under all heads where in contact with wood; use washers under all nuts. Bolts shall meet the requirements of ANSI/ASME Standard B18.2.1.
- 3. Screws: In accordance with ANSI/ASME Standard B18.6.1.
- 4. Connectors, Joist Hangers, Anchors, Etc.: Type and size to meet job conditions and as indicated on the Drawings, or as required, as manufactured by Simpson Co., San Leandro, California 94577 or acceptable substitution.

3.1 INSTALLATION

- A. Provide and securely fasten wood nailing strips, plates, blocking, etc., at proper levels in stud partitions, to anchor all items which require use of wood blocking to fasten or support components and accessories, and as nailers used in conjunction with roofing membrane, sheet metal and flashing and roofing accessories.
- B. Workmanship and General Framing
 - 1. Selection of Lumber Pieces: Carefully select all members, selecting pieces so that knots and obvious defects will not interfere with placing bolts, nailing or making connections. Lumber may be rejected by Architect, whether or not is has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.
 - 2. Shimming: Do not shim sills, joists, short studs, trimmers, headers, lintels, or other framing components.
 - 3. Framing: Set all horizontal or sloped members with crown up. Do not notch, bore, or cut members for pipes, ducts, conduits, or other reasons except as indicated on Drawings or approved by Architect.
 - 4. Bearings: Make all bearings full unless indicated otherwise. Finish all bearing surfaces on which structural members are resting to give sure and even support. Where framing members slope, cut or notch ends as required for uniform bearing surface.
 - 5. Blocking: Install all blocking required to support all items of finish and to cut off all concealed draft openings, both vertical and horizontal, between ceiling and floor areas.
 - 6. Bridging: Cross bridging shall be of not less than two (2) inches by three (3) inches nominal wood or of metal cross bridging of equal strength. Space lines of bridging at eight (8) feet max.
 - 7. Nailing:
 - a. All nailing shall be in accordance with the Contract Drawings.
 - b. For conditions not covered in the Contract Drawings, provide penetration into piece receiving the point of not less than 1/2 the length of the nail or spike.
 - c. Do all nailing without splitting wood. Pre-bore as required. Replace all split members at Contractor's expense.
 - 8. Bolting: Drill holes 1/16 inch larger in diameter than bolts being used. Drill straight and true from one side only. Oversize holes, where specified, shall be 1/8" larger in diameter than bolts being used.
 - a. Bolt threads shall not bear on wood. Use washers under head and nut where both bear on wood. Use washers under all nuts.
 - 9. Screws: Pre-bore holes in accordance with the National Design Specification for Wood Construction.

END OF SECTION 06_1000

SECTION 06_1053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Rooftop equipment bases and support curbs.
- 2. Wood blocking and nailers.
- 3. Wood furring.
- 4. Wood sleepers.
- 5. Utility shelving.
- 6. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Preservative-treated wood.
 - 2. Fire-retardant-treated wood.
 - 3. Power-driven fasteners.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Lumber and plywood shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated. See Structural Notes in the Drawings (Sheets S1.1 and S1.2).

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fireretardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 3. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- C. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Framing for raised platforms.
 - 2. Concealed blocking.
 - 3. Roof framing and blocking.

- 4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
- 5. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
 - 6. Grounds.
 - 7. Utility shelving.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.
- C. For utility shelving, provide lumber with 15 19 percent maximum moisture content of eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
 - 1. Mixed southern pine, No. 2 grade; SPIB.
 - 2. Eastern softwoods, No. 2 Common grade; NELMA.
 - 3. Northern species, No. 2 Common grade; NLGA.
 - 4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exterior, AC, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.
 - 1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.
- B. Power-Driven Fasteners: NES NER-272.

C. Screws for Fastening to Metal Framing: ASTM C 1002 or ASTM C 954, length as recommended by screw manufacturer for material being fastened.

2.7 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- C. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06_1053
SECTION 06_1323 - HEAVY TIMBER CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes framing using timbers.

1.2 DEFINITIONS

- A. Timbers: Lumber of 5 inches nominal or greater in least dimension.
- B. Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA Northeastern Lumber Manufacturers Association.
 - 2. NHLA National Hardwood Lumber Association.
 - 3. NLGA National Lumber Grades Authority.
 - 4. SPIB Southern Pine Inspection Bureau.
 - 5. WCLIB West Coast Lumber Inspection Bureau.
 - 6. WWPA Western Wood Products Association.

1.3 INFORMATIONAL SUBMITTALS

A. Certificates of Inspection: Issued by lumber grading agency for exposed timber not marked with grade stamp.

1.4 QUALITY ASSURANCE

A. Timber Standard: Comply with AITC 108, "Standard for Heavy Timber Construction."

PART 2 - PRODUCTS

2.1 TIMBER

- A. General: Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable.
 - 1. Factory mark each item of timber with grade stamp of grading agency.
 - 2. For exposed timber indicated to receive a stained or natural finish, apply grade stamps to surfaces that will not be exposed to view, or omit grade stamps and provide certificates of grade compliance issued by grading agency.
- B. Certified Wood: Timber shall be produced from wood obtained from forests certified by an FSCaccredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

- C. Timber Species and Grade: Balsam fir, Douglas fir-larch, Douglas fir-larch (North), eastern hemlock tamarack (North), hem-fir, southern pine, western hemlock, or western hemlock (North); Select Structural, NeLMA, NLGA, SPIB, WCLIB, or WWPA.
- D. Timber Species and Grade: Alaska cedar; [Select Structural] [No. 1] [No. 2], WCLIB.
- E. Timber Species and Grade: Douglas fir-larch or Douglas fir-larch (North); [Dense Select Structural] [Select Structural] [No. 1 Dense] [No. 1] [No. 2], NLGA, WCLIB, or WWPA.
- F. Timber Species and Grade: Hem-fir or hem-fir (North); [Select Structural] [No. 1] [No. 2], NLGA, WCLIB, or WWPA.
- G. Timber Species and Grade: Southern pine; [Dense Select Structural] [Select Structural] [No. 1 Dense]
 [No. 1] [No. 2 Dense] [No. 2], SPIB.
- H. Timber Species and Grade: Any species and grade that, for moisture content provided, complies with required structural properties.
 - 1. Allowable Stress Ratings for 12-Inch Nominal (286-mm Actual) Depth: [Fb 1500 psi (10.3 MPa) and E 1,500,000 psi (10 340 MPa)] [Fb 1300 psi (9.0 MPa) and E 1,300,000 psi (8 960 MPa)] [As indicated on Drawings] <Insert values>.
- I. Moisture Content: Provide timber with 19 percent maximum moisture content at time of dressing.
- J. Dressing: Provide [dressed timber (S4S)] [timber that is rough sawn (Rgh)].
- K. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.
- L. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.
- M. Low-Emitting Materials: Sealers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 TIMBER CONNECTORS

- A. General: Unless otherwise indicated, fabricate from the following materials:
 - 1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
 - 2. Round steel bars complying with ASTM A 575, Grade M 1020.
 - 3. Hot-rolled steel sheet complying with ASTM A 1011/A 1011M, Structural Steel, Type SS, Grade 33.
- B. Provide bolts, 3/4 inch unless otherwise indicated, complying with ASTM A 307, Grade A; provide nuts complying with ASTM A 563; and, where indicated, provide flat washers.
- C. Provide shear plates, 2-5/8 inches in diameter, complying with ASTM D 5933.
- D. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil dry film thickness.

- 1. Primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

2.3 FABRICATION

- A. Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
- B. Coat crosscuts with end sealer.
- C. Seal Coat: After fabricating and surfacing each unit, apply a saturation coat of penetrating sealer on surfaces of each unit except for treated wood where the treatment included a water repellent.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Erect heavy timber construction true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
- B. Fit members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.
 - 1. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
 - 2. Coat crosscuts with end sealer.
- C. Install timber connectors as indicated.
 - 1. Install bolts with orientation as indicated or, if not indicated, as directed by Architect.
- D. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber construction if repairs are not approved by Architect.

SECTION 06_1500 - WOOD DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-sawn, tongue-and-groove wood roof decking.
- B. Related Sections:
 - 1. Division 06 Section "Rough Carpentry" for dimension lumber items associated with wood decking.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: 24 inches (600 mm) long, showing the range of variation to be expected in appearance of wood decking.

1.4 QUALITY ASSURANCE

A. Standard for Solid-Sawn Wood Decking: Comply with AITC 112.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Schedule delivery of wood decking to avoid extended on-site storage and to avoid delaying the Work.
- B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings. Stack wood decking with surfaces that are to be exposed in the final Work protected from exposure to sunlight.

PART 2 - PRODUCTS

2.1 WOOD DECKING, GENERAL

- A. General: Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
- B. Moisture Content: Provide wood decking with 15 percent maximum moisture content at time of dressing.

WOOD DECKING

2.2 SOLID-SAWN WOOD DECKING

- A. Decking Species: Douglas fir-larch or Douglas fir-larch (North).
- B. Decking Nominal Size: 2x6 or 1x6. See Plans for Location.
- C. Decking Grade: Select Decking.
- D. Grade Stamps: Factory mark each item with grade stamp of grading agency. Apply grade stamp to surfaces that will not be exposed to view.
- E. Face Surface: Smooth.
- F. Edge Pattern: Vee grooved, tongue-and-grooved configuration.

2.3 ACCESSORY MATERIALS

- A. Fasteners for Solid-Sawn Decking: Provide fastener size and type complying with decking standard for thickness of deck used.
- B. Nails: Common; complying with ASTM F 1667, Type I, Style 10.
- C. Screws for metal sub-frame: Self-tapping stainless steel steel for exterior applications
- D. Spikes: Round; complying with ASTM F 1667, Type III, Style 3.
- E. Fastener Material: Hot-dip galvanized steel.
- F. Bolts for Anchoring Decking to Supporting Structure: Carbon steel; complying with ASTM A 307 (ASTM F 568M) with ASTM A 563/A 563M hex nuts and, where indicated, flat washers, all hot-dip zinc coated.
- G. Sealant: Elastomeric joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic).
- H. Penetrating Sealer: Clear sanding sealer complying with Division 09 Section "Staining and Transparent Finishing" and compatible with topcoats specified for use over it.

2.4 FABRICATION

- A. Shop Fabrication: Where preservative-treated decking is indicated, complete cutting, trimming, surfacing, and sanding before treating.
- B. Predrill decking for lateral spiking to adjacent units to comply with referenced decking standard.
- C. Seal Coat: After fabricating and surfacing decking, apply a saturation coat of penetrating sealer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine support framing in areas to receive wood decking for compliance with installation tolerances and other conditions affecting performance of wood decking.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install solid-sawn wood decking to comply with referenced decking standard.
 - 1. Locate end joints for controlled random lay-up unless otherwise idicated.
 - 2. Nail each course of wood decking at each support with one nail slant nailed above the tongue and one nail straight nailed through the face.
 - a. Use 12d nails for 2x6 and 2x8 decking.
 - 3. Slant nail each course of wood decking to the tongue of the adjacent course at 30 inches (750 mm) o.c. and within 12 inches (300 mm) of the end of each unit. Stagger nailing in adjacent courses 15 inches (380 mm).
 - a. Use 6d nails for 2x6 and 2x8 decking.
- B. Anchor wood roof decking with bolts as indicated.
- C. Apply joint sealant to seal roof decking at exterior walls at the following locations:
 - 1. Between decking and supports located at exterior walls.
- D. Reference Structural Drawings and Specifications for additional information.

3.3 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged decking if repairs are not approved by Architect.

3.4 PROTECTION

A. Provide temporary waterproof covering as the Work progresses to protect roof decking until roofing is applied.

SECTION 06_1600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Sheathing joint and penetration treatment.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For following products, from ICC-ES:
 - 1. APA rated plywood or OSB equivalent.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Certified Wood: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
 - 1. Plywood.
 - 2. Oriented strand board.
 - 3. Particleboard underlayment.
 - 4. Hardboard underlayment.

2.2 WALL SHEATHING

A. Plywood Wall Sheathing: per plan

SHEATHING

B. Oriented-Strand-Board Wall Sheathing: per plan

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For wall sheathing, provide fasteners per plan

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following: per plan
- D. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall Sheathing:
 - a. Screw to cold-formed metal framing.
 - b. Space panels 1/8 inch (3 mm) apart at edges and ends.

SECTION 06_1800 - GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes framing using structural glued-laminated timber.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with requirements in AITC A190.1.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide factory-glued structural units produced by an AITC- or APAlicensed firm that is certified for chain of custody by an FSC-accredited certification body.
 - 1. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that will not be exposed in the completed Work.
- B. Quality Standard: Comply with AITC A190.1.
- C. Forest Certification: Provide structural glued-laminated timber produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with provisions in AITC 111.
- B. Individually wrap members using plastic-coated paper covering with water-resistant seams.

PART 2 - PRODUCTS

2.1 STRUCTURAL GLUED-LAMINATED TIMBER

- A. General: Provide structural glued-laminated timber that complies with AITC 117 or research/evaluation reports acceptable to authorities having jurisdiction.
 - 1. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
 - 2. Provide structural glued-laminated timber made with wet-use adhesive complying with AITC A190.1.

GLUED-LAMINATED CONSTRUCTION

- a. Use adhesive that contains no urea-formaldehyde resins.
- B. Species and Grades for Structural Glued-Laminated Timber: Douglas fir-larch, Spruce Pine Fir or other approved species that complies with structural properties and beam stress classifications indicated.
- C. Species and Grades for Beams and Purlins:
 - 1. Species and Beam Stress Classification: 24f-v8 for beams, 24f-v4 for purlins.
 - 2. Lay-up: Balanced.
- D. Appearance Grade: Architectural. complying with AITC 110.
- E. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.
- F. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.2 TIMBER CONNECTORS

- A. General: Unless otherwise indicated, fabricate from the following materials:
 - 1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
 - 2. Round steel bars complying with ASTM A 575, Grade M 1020.
 - 3. Hot-rolled steel sheet complying with ASTM A 1011/A 1011M, Structural Steel, Type SS, Grade 33.
- B. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil dry film thickness.

2.3 FABRICATION

- A. Shop fabricate for connections to greatest extent possible, including cutting to length and drilling bolt holes.
- B. End-Cut Sealing: Immediately after end cutting each member to final length, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.
- C. Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Erect structural glued-laminated timber true and plumb, and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
 - 1. Lift with padded slings and protect corners with wood blocking.

GLUED-LAMINATED CONSTRUCTION

- B. Fit structural glued-laminated timber by cutting and restoring exposed surfaces to match specified surfacing.
 - 1. Predrill for fasteners using timber connectors as templates.
 - 2. Dress exposed surfaces as needed to remove planing and surfacing marks.
 - 3. Coat cross cuts with end sealer.
- C. Cutting: Avoid cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.
- D. Repair damaged surfaces after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by Architect.
- E. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose including protection from weather, sunlight, soiling, and damage from work of other trades.
 - 1. Slit underside of wrapping to prevent accumulation of moisture inside the wrapping.

SECTION 06_2013 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior wood trim.
 - 2. Exterior Plywood Cedar siding.

B. Related Requirements:

- 1. Section 061063 "Exterior Rough Carpentry" for elevated decks including stairs and railings.
- 2. Section 064013 "Exterior Architectural Woodwork" for shop-fabricated exterior woodwork.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
- B. Samples: For each type of product involving selection of colors, profiles, or textures.

1.3 INFORMATIONAL SUBMITTALS

- A. Compliance Certificates:
 - 1. For lumber that is not marked with grade stamp.
 - 2. For preservative-treated wood that is not marked with treatment-quality mark.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Regional Materials: The following wood products shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
 - 1. Exterior trim.
 - 2. Exterior plywood siding.
- B. Certified Wood: The following wood products shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":

- 1. Exterior trim.
- 2. Exterior plywood siding.
- C. Lumber: DOC PS 20.
 - 1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
 - a. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- D. Softwood Plywood: DOC PS 1.
- E. Hardboard: ANSI A135.4.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent respectively.
 - 2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 3. Application: All exterior lumber and plywood.

2.3 EXTERIOR TRIM

- A. Lumber Trim:
 - 1. Species and Grade: Redwood, Clear All Heart; RIS.
 - 2. Species and Grade: Western red cedar, Clear Heart VG (Vertical Grain); NLGA, WCLIB, or WWPA.
 - 3. Species and Grade: Southern pine, pressure-preservative treated; B & B; SPIB.
 - 4. Species and Grade: Eastern white pine, eastern hemlock-balsam fir-tamarack, eastern spruce, or white woods; D Select (Quality); NeLMA, NLGA, WCLIB, or WWPA.
 - 5. Maximum Moisture Content: 19 percent.
 - 6. Face Surface: Surfaced (smooth).
- B. Moldings: WMMPA WM 4, N-grade wood moldings, without finger jointing. Made from kiln-dried stock to patterns included in WMMPA WM 12.
 - 1. Species: Western red cedar.

2.4 PLYWOOD SIDING

- A. Plywood Type: APA-rated siding, pressure-preservative treated in panel sizes indicated.
 - 1. Face Grade: 303-OC.
 - 2. Face Grade: 303-6.
- B. Thickness: As indicated.

- C. Face Species: Western red cedar.
- D. Pattern: Plain.
- E. Surface: Smooth.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.
 - 2. For applications not otherwise indicated, provide stainless-steel fasteners.
- B. Insect Screening for Soffit Vents: Aluminum, 18-by-16-inch.
- C. Continuous Soffit Vents: Aluminum hat channel shape with stamped louvers, 4 inches wide and in lengths not less than 96 inches.
 - 1. Net Free Area: 4 sq. in./linear ft..
 - 2. Finish: Mill finish.
- D. Sealants: Latex, complying with ASTM C 834 Type OP, Grade NF and with applicable requirements in Section 079200 "Joint Sealants," recommended by sealant manufacturer and manufacturer of substrates for intended application.

PART 3 - EXECUTION

3.1 **PREPARATION**

A. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed. Cut to required lengths and prime ends. Comply with requirements in Section 099113 "Exterior Painting."

3.2 INSTALLATION, GENERAL

- A. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.

3.3 STANDING AND RUNNING TRIM INSTALLATION

- A. Install flat-grain lumber with bark side exposed to weather.
- B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary.
 - 1. Use scarf joints for end-to-end joints.

EXTERIOR FINISH CARPENTRY

- 2. Stagger end joints in adjacent and related members.
- C. Fit exterior joints to exclude water. Cope at returns and miter at corners.

3.4 SIDING INSTALLATION

- A. Install siding to comply with manufacturer's written instructions and warranty requirements.
- B. Lumber Siding: Apply starter strip along bottom edge of sheathing or sill. Install first course of siding with lower edge at least 1/8 inch below starter strip and subsequent courses lapped 1 inch over course below. Nail at each stud. Do not allow nails to penetrate more than one thickness of siding.
- C. Plywood Siding: Install panels with edges over framing or blocking. Nail at 6 inches o.c. at panel perimeter and 12 inches o.c. at intermediate supports unless manufacturer recommends closer spacing. Leave 1/16-inch gap between adjacent panels and 1/8-inch gap at perimeter, openings, and horizontal joints unless otherwise recommended by panel manufacturer.
 - 1. Seal butt joints at inside and outside corners and at trim locations.

SECTION 06_4023 – PLASTIC LAMINATE FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 RELATED SECTIONS

- A. Section 06_4113 "Wood Veneer Faced Architectural Cabinets" for custom wood cabinets located at the Reception Area.
- B. Section 06_1000 "Rough Carpentry" for miscellaneous wood framing and blocking.

1.3 SUMMARY

- A. This Section includes the following:
 - 1. Decorative plastic-laminate faced cabinets and cabinet hardware.
 - 2. Decorative Plastic-laminate countertops.
 - 3. Solid phenolic surface countertops and trim.

1.4 **DEFINITIONS**

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated, including cabinet hardware and accessories and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.
 - 1. Plastic laminates.
 - 2. Solid-surfacing materials.
 - 3. Moldings.

- D. Samples for Verification: For the following:
 - 1. Plastic-laminate-clad panel products, 8 by 10 inches, for each type, color, pattern, and surface finish.
 - 2. Solid-surfacing materials, 6 by 6 inches, for each type, color, pattern, and surface finish.
- E. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's 2009 "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
 - 2. Particleboard: ANSI A208.1, Grade M-2.
 - 3. Softwood Plywood: DOC PS 1, Medium Density Overlay.
 - 4. Hardwood Plywood and Face Veneers: HPVA HP-1.
- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering highpressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:
 - a. Formica Corporation.
 - b. Nevamar Company.
 - c. Pionite
 - d. Wilsonart International; Div. of Premark International, Inc.
 - e. Arpa USA.
- D. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a precoated finish.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Avonite; Avonite, Inc.
 - b. LG Hausys; Hi-MACS
 - c. Corian; DuPont Polymers.
 - d. Silestone; Consentino International.
 - e. Surell; Formica Corporation.
 - f. Gibraltar; Wilsonart International, Div. of Premark International, Inc.
- E. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork.
- B. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:
 - 1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
 - 2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- C. Drawer System: Integral drawer slide and drawer side panel, equal to "Metabox", Medium Side (86mm) with full drawer extension, as manufactured by Julius Blum, Inc. Provide minimum 18" (450mm) drawer length for 24" deep cabinets and above.
 - 1. Alternate Manufacturer: Grass America Drawer Slides, Series 6036,100-Pound Unigrass, 85m High Side. Provide minimum 470mm drawer length for 24" deep cabinets and above.
- D. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- E. Catches: Magnetic catches, BHMA A156.9, B03141.
- F. Door Locks: BHMA A156.11, E07121. Provide lock on each door.
- G. Drawer Locks: BHMA A156.11, E07041. Provide lock on each drawer.
- H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Stainless Steel: BHMA 630.

2.3 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 CABINET FABRICATION, GENERAL

- A. Cabinet Bodies: shall be flush overlay construction with 1/4" to 5/16" radiused corners on doors and drawers. Construction shall be in accordance with approved manufacturers' standard specifications to insure stability and prevent racking when fully loaded.
- B. Bodies of base cabinets:
 - 1. Bottom and sides shall be made of 3/4" industrial particle board, 45-47 lb. density, face side laminated with 8 to 9 mil white melamine resin-saturated overlay and the non-exposed side laminated with a phenolic backing sheet for balanced construction.
 - 2. The back panel shall be made of 1/4" 45-47 lb. density industrial particle board with 8-9 mil white melamine resin-saturated overlay on the face side and the non-exposed side with a sealer for balanced construction.

- 3. Top of the base cabinets and below the top set of drawers to full framed in wood or a full sheet of 3/8" particle board sub top may be used.
- 4. Back panels shall be full bound, captured in grooves on cabinet sides, top and bottom and secured with staples and a hot weld glue around entire back perimeter.
- 5. Sides, top and bottom shall be fastened securely in accordance with approved manufacturers standard specifications to insure stability and prevent racking when fully loaded. Top of base cabinet and between top drawers shall consist of wood frame fastened to the body with approved manufacturers standard specifications.
- C. Bodies of upper and/or full height cases:
 - 1. These units shall be made of similar materials and construction as described for Bodies of base cabinets except the top member shall be solid 3/4" 45-47 lb. density industrial particle board laminated with 8 to 9 mil with melamine resin-saturated overlay rather than a wood frame.
 - 2. On wall units a 3/8"x 2-1/2" hanging filler strip shall be screwed and glued to the top and bottom of the cabinet.
 - 3. On full height cabinets a 3/8"x 2-1/2" fill strip shall be screwed and glued to the top of the cabinet.

D. Drawers:

- 1. Construct drawers using the Blum Metabox System. Drawer backs and bottoms shall be made of 3/4" particle board with a white melamine finish. Metabox system shall be white.
- E. Shelves and Partitions:
 - 1. Standard shelves and partitions shall be 3/4" industrial particle board 45-47 lb. density laminated both sides with 8 to 9 mil white melamine resin saturated overlay. Shelves 36" long shall be 1" thick. Front and sides shall be edged with "T" edge.
 - 2. Adjustable shelves shall be installed on recessed KV-255 standards and KV-256 brackets or LH heavy duty nylon or metal self supports with drilled holes at 2" o.c..
- F. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- G. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- H. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
 - 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- I. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- J. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.

2.5 PLASTIC-LAMINATE CABINETS

- A. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.
- B. Grade: Custom.
 - 1. All woodwork is Custom grade except woodwork with directional laminate or wood veneer faces. In these cases, grain matching of the casework faces will be "Premium Grade," and all other details will remain Custom grade.
- C. AWI Type of Cabinet Construction: Flush overlay.
- D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: HGS.
 - 2. Postformed Surfaces: HGP.
 - 3. Vertical Surfaces: HGS.
 - 4. Cabinet Body Edges: 1 mm thick edging
 - 5. Shelves, Doors, Drawers: 3 mm thick edging.
- E. Materials for Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
- F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces that match colors in Finish Legend on Drawings.
- G. Hardboard above compartments and drawers, unless located directly under tops.

2.6 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate Grade: HGS.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces that match colors in Finish Legend on Drawings.
- E. Grain Direction: Parallel to cabinet fronts.
- F. Edge Treatment: Same as laminate cladding on horizontal surfaces or wood edging as indicated as indicated on the Drawings.
- G. Core Material: Particleboard or medium-density fiberboard.
- H. Core Material at Sinks: Particleboard made with exterior glue.

2.7 SOLID-SURFACING-MATERIAL COUNTERTOPS AND TRIM PIECES

- A. Quality Standard: Comply with AWI Section 400 requirements for countertops.
- B. Grade: Custom.
- C. Solid-Surfacing-Material Thickness: ³/₄ inch.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of solid surfacing material that match colors in Finish Legend on Drawings.
- E. Fabricate tops in one piece with shop-applied backsplashes and edges. Comply with solid-surfacingmaterial manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

PART 3 - EXECUTION

3.1 **PREPARATION**

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with recommendations of chemical treatment manufacturer, including those for adhesives used to install woodwork.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood blocking.

- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 3. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
 - 4. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."
- H. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

SECTION 06_4113 - WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Architectural wood cabinets.
 - 2. Wood furring, blocking, shims, and hanging strips for installing architectural wood cabinets unless concealed within other construction before cabinet installation.
 - 3. Shop finishing of architectural wood cabinets.
- B. Related Requirements:
 - 1. Section 06_1000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products, cabinet hardware and accessories and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural wood cabinets.
 - 4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
- C. Samples for Initial Selection:
 - 1. Shop-applied transparent finishes.
 - 2. Shop-applied opaque finishes.
 - 3. PVC edge material.
 - 4. Thermoset decorative panels.
- D. Samples for Verification:
 - 1. Lumber for transparent finish, not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

- 2. Veneer leaves representative of and selected from flitches to be used for transparent-finished cabinets.
- 3. Lumber and panel products with shop-applied opaque finish, 5 inches wide by 12 inches long for lumber and 8 by 10 inches for panels, for each finish system and color, with one-half of exposed surface finished.
- 4. Thermoset decorative panels, 8 by 10 inches for each color, pattern, and surface finish, with edge banding on one edge.
- 5. Corner pieces as follows:
 - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
- 6. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer & fabricator.
- B. Product Certificates: For following:
 - 1. Composite wood and agrifiber products.
 - 2. Adhesives.
- C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that wood-veneer-faced architectural cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET FABRICATORS

A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of architectural wood cabinets with sequence-matched wood veneers wood paneling wood doors with face veneers that are sequence matched with woodwork and transparent-finished wood doors that are required to be of same species as woodwork.

2.2 ARCHITECTURAL WOOD CABINETS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

2.3 WOOD CABINETS FOR TRANSPARENT FINISH

- A. Grade: Premium.
- B. Regional Materials: Wood cabinets for transparent finish shall be manufactured within 500 miles of Project site.
- C. Type of Construction: As indicated on drawings.
- D. Cabinet and Door and Drawer Front Interface Style: Flush overlay.
- E. Wood for Exposed Surfaces:
 - 1. Species: Maple Veneer Plywood (Europly by Columbia Forest Products, <u>www.cfpwood.com</u>, 1-800-547-1791). No added urea formaldehyde in compliance with LEED EQ4.4.
 - 2. Cut: Plain sliced/plain sawn.
 - 3. Grain Direction: Vertically for drawer fronts, doors, and fixed panels.
 - 4. Matching of Veneer Leaves: Book match.
 - 5. Veneer Matching within Panel Face: Running match.

- 6. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.
- 7. Comply with veneer and other matching requirements indicated for blueprint-matched paneling.
- F. Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces
 - 2. Drawer Subfronts, Backs, and Sides: Solid-hardwood lumber, same species indicated for exposed surfaces.
 - 3. Drawer Bottoms: Hardwood plywood.
- G. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.4 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
 - 2. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Composite Wood and Agrifiber Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde
 - Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde. Europly by Columbia Forest Products, <u>www.cfpwood.com</u>, 1-800-547-1791
- C. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- D. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, selfclosing.
- E. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- F. Catches: Magnetic catches, BHMA A156.9, B03141.
- G. Drawer Slides: BHMA A156.9.
 - 1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer; partialextension type; zinc-plated steel with polymer rollers.
- H. Door Locks: BHMA A156.11, E07121.

- I. Drawer Locks: BHMA A156.11, E07041.
- J. Door and Drawer Silencers: BHMA A156.16, L03011.
- K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.
- D. Metal Base Trim: Clear anodized aluminum floor molding. 1-1/2" x ½" x 1/16" aluminum angle, part #2899 as manufactured by Pemko Manufacturing Co. (an Assa Abloy company) www.pemko.com. Configuration as shown on drawings.

2.6 FABRICATION

- A. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets: 1/16 inch unless otherwise indicated.
- B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.7 SHOP FINISHING

- A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Finish Materials: Use finish materials that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.
- D. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: System 11, catalyzed polyurethane.
 - 3. Staining: Per Finish Schedule sheet AF-601.
 - 4. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1. For shop finished items use filler matching finish of items being installed.

- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
 - 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

SECTION 06_4800 - WOOD FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior frames and jambs.
 - 2. Interior frames and jambs.
 - 3. Shop priming wood frames and jambs.
 - 4. Shop finishing wood frames and jambs.

1.3 SUBMITTALS

- A. Product Data: For each type of product include details of construction, fire-retardant-treated materials and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples:
 - 1. Lumber for transparent finish, for each species and cut, finished on one side and one edge.
 - 2. Lumber with shop-applied opaque finish, for each finish system and color, with exposed surface finished.

1.4 INFORMATIONAL SUBMITTALS

A. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program.

1.5 QUALITY ASSURANCE

- A. Source limitations: Obtain flush wood doors and wood jambs through one source from a single manufacturer.
- B. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program.
- C. Fire-Rated Wood Jambs: Jambs complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252. 450 deg F

1.6 FIELD CONDITIONS

- A. Weather Limitations for Exterior Work: Proceed with installation of exterior wood frames only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.
- B. Environmental Limitations for Interior Work: Do not deliver or install interior wood frames until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 WOOD FRAME FABRICATORS

- A. Fabricators: Subject to compliance with requirements, available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Marshfield
 - 2. Graham Maiman

2.2 WOOD FRAMES, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of wood frames indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels from AWI certification program indicating that woodwork complies with requirements of grades specified.

2.3 INTERIOR FRAMES AND JAMBS FOR TRANSPARENT FINISH

- A. Grade: **Premium**.
- B. Certified Wood: Interior frames and jambs for transparent finish shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- C. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
- D. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard or fireretardant medium-density fiberboard with veneered exposed surfaces and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. Fire Rating: 20 minutes.
 - 2. Fire Rating: 90 minutes

2.4 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of wood frame and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content for Interior Materials: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of wood frame and quality grade specified unless otherwise indicated.
 - 1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 - 2. Composite Wood and Agrifiber Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 3. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde].
 - 4. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.

2.5 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
 - 1. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Kiln dry lumber after treatment to a maximum moisture content of 19 percent.
- C. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.
 - 1. For panels 3/4 inch (19 mm) thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi (11 MPa); modulus of elasticity, 300,000 psi (2070 MPa); internal bond, 80 psi (550 kPa); and screw-holding capacity on face and edge, 250 and 225 lbf (1100 and 1000 N), respectively.
 - 2. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Flakeboard Company Limited;</u> Duraflake FR.
 - b. <u>SierraPine;</u> Encore FR.
- D. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel

manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

- 1. <u>Products</u>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Panel Source International, Inc.;</u> Pyroblock Platinum.
 - b. <u>SierraPine;</u> Medite FR.

2.6 MISCELLANEOUS MATERIALS

- A. Exterior Blocking, Shims, and Nailers: Softwood or hardwood lumber kiln dried to less than 15 percent moisture content.
 - 1. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b.
 - a. Kiln dry lumber after treatment to a maximum moisture content of 19 percent.
 - b. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.
- B. Interior Blocking, Shims, and Nailers:, kiln dried to less than 15 percent moisture content.
- C. Provide self-drilling screws for metal-framing supports.
- D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- E. Adhesives: Do not use adhesives that contain urea formaldehyde.
- F. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FABRICATION

- A. Fabricate wood frames to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Edges of Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.

2.8 SHOP PRIMING

- A. Interior Wood Frames for Transparent Finish: Shop seal with stain (if required), other required pretreatments, and first coat of finish as specified in Section 099300 "Staining and Transparent Finishing."
- B. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing wood frames, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of wood trim. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

2.9 SHOP FINISHING

- A. General: Finish wood frames at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Section 099300 "Staining and Transparent Finishing" for field finishing wood frames not indicated to be shop finished.
- C. Finish Materials: Use finish materials that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing wood frames, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of wood frames. Apply two coats to end-grain surfaces.

PART 3 - EXECUTION

3.1 **PREPARATION**

A. Before installation, condition wood frames to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

- A. Grade: Install wood frames to comply with same grade as item to be installed.
- B. Install wood frames level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- C. Scribe and cut wood frames to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- E. Anchor wood frames to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1. For shop-finished items, use filler matching finish of items being installed.

SECTION 06_6400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.
- B. Related Sections:
 - 1. Section 06_1000 "Rough Carpentry" for wood furring for installing plastic paneling.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
 - 3. Testing Agency: UL.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.

PLASTIC PANELING
- 1. <u>Basis-of-Design Product</u>: Subject to compliance with requirements, provide product indicated on Drawings (Finish Schedule sheet A1-701) or comparable product by one of the following:
 - a. <u>Kemlite Company Inc</u>.
 - b. <u>Marlite</u>.
 - c. <u>Nudo Products, Inc</u>.
- 2. Low-Emitting Materials: Paneling shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- 3. Nominal Thickness: Not less than 0.075 inch.
- 4. Surface Finish: As selected by Architect from manufacturer's full range.
- 5. Color: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 - 1. Color: As selected by Architect from manufacturer's full range.
- B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
- C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.
- D. Adhesive: As recommended by plastic paneling manufacturer.
 - 1. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07_9200 "Joint Sealants."
 - 1. Sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.

- B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- C. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
- D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- E. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels so that trimmed panels at corners are not less than 12 inches wide.

3.3 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
 - 1. Drill oversized fastener holes in panels and center fasteners in holes.
 - 2. Apply sealant to fastener holes before installing fasteners.
- C. Install trim accessories with adhesive. Do not fasten through panels.
- D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.
- G. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 06_6400

DIVISION 07 – THERMAL & MOISTURE

SECTION 07_1324 - PRE-APPLIED SHEET MEMBRANE WATERPROOFING

PART 1 — GENERAL

1.01 SUMMARY

- A. The Work of this Section includes, but is not limited to, pre-applied sheet membrane waterproofing that forms an integral bond to poured concrete for the following applications:
 - 1. Vertical Applications: Membrane applied against soil retention system prior to placement of concrete foundation walls;
 - 2. Horizontal Applications: Membrane applied on prepared subbase prior to placement of concrete slabs.
- B. Related sections include, but are not limited to, the following:
 - 1. Section 031000 Concrete Forming
 - 2. Section 312000 Earth Moving
 - 3. Section 031500 Concrete Accessories
 - 4. Section 031500 Hydrophilic Waterstop
 - 5. Section 316200 Driven Piles
 - 6. Section 316400 Caissons
 - 1. Section 032000 Concrete Reinforcing
 - 2. Section 033000 Cast-In-Place Concrete

1.02 SUBMITTALS

A. Submit manufacturer's product data, installation instructions and membrane samples for approval.

1.03 REFERENCE STANDARDS

- A. The following standards and publications are applicable to the extent referenced in the text.
- B. American Society for Testing and Materials (ASTM):
 - C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
 - D 412 Standard Test Methods for Rubber Properties in Tension
 - D 570 Standard Test Method for Water Absorption of Plastics
 - D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 - D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
 - D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - D 3767 Standard Practice for Rubber Measurements of Dimensions
 - D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
 - E 96 Standard Test Methods for Water Vapor Transmission of Materials
 - E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

1.04 QUALITY ASSURANCE

- A. Manufacturer: Sheet membrane waterproofing system shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.
- B. Installer: A firm which has at least 3 years experience in work of the type required by this section.
- C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.
- D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

E. Schedule Coordination: Schedule work such that membrane will not be left exposed to weather for longer than that recommended by the manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's instructions. Protect from damage from weather, excessive temperature and construction operations. Remove and dispose of damaged material in accordance with applicable regulations.

1.06 PROJECT CONDITIONS

A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

1.07 WARRANTY

A. Sheet Membrane Waterproofing: Provide written five year material warranty issued by the membrane manufacturer upon completion of work.

PART 2 — PRODUCTS

2.01 MATERIALS

A. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: PREPRUFE[®] 300R Membrane [or PREPRUFE[®] 300LT Membrane for application temperatures between 25°F (-4°C) and 60°F (+16°C)] by GCP Applied Technologies ("GCP"), a 1.2mm (0.046 in) nominal thickness composite sheet membrane comprising 0.8 mm (0.030 in.) of high density polyethylene film, and layers of specially formulated synthetic adhesive. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

Property	Test Method	Typical Value
Color		White
Thickness	ASTM D 3767	1.2 mm (0.046 in.) nominal
Lateral Water Migration	ASTM D 5385 ¹	Pass at 71 m (231 ft.) of
Resistance		hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -29°C (-20°F)
Elongation	ASTM D 412^2	400%
Crack Cycling at -23°C (-9.4°F),	ASTM C 836 ⁵	Unaffected, Pass
100 Cycles		
Tensile Strength, film	ASTM D 412	27.6 MPa (4,000 lbs./in. ²)
Peel Adhesion to Concrete	ASTM D 903 ³	880 N/m (5.0 lbs./in.)
Resistance to Hydrostatic Head	ASTM D 5385 ⁶	231ft. (71m)
Lap Adhesion	ASTM D 1876 ⁴	880 N/m (5.0 lbs./in.)
Puncture Resistance	ASTM E 154	890N (200 lbs.)
Permeance	ASTM E 96 Method B	<0.1 perms ((5.74 ng/(Pa x s x
		m ²))
Water Absorption	ASTM D 570	0.5%

PHYSICAL PROPERTIES FOR PREPRUFE® 300R (or 300LT) MEMBRANE:

Footnotes:

- 1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.
- 2. Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.

PRE-APPLIED SHEET MEMBRANE WATERPROOFING

- 3. Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
- 4. The test is conducted 15 minutes after the lap is formed at a rate of 50 mm (2 in.) per minute.
- 5. *Test conducted at* $-23^{\circ}C(-9.4^{\circ}F)$
- 6. Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.

PART 3 — EXECUTION

3.01 EXECUTION

A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 SUBSTRATE PREPARATION

- A. It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability.
 - 1. Horizontal Surfaces The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.
 - 2. Vertical Surfaces Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment

3.03 INSTALLATION, HORIZONTAL APPLICATIONS

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
 - 1. Place the PREPRUFE[®] 300R membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
 - 2. Leave the plastic release liner in position until overlap procedure is completed.
 - 3. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
 - 4. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
 - 5. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

3.04 INSTALLATION, VERTICAL APPLICATIONS

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
 - 1. Where desired mechanically fasten the PREPRUFE[®] 300R or PREPRUFE[®]160R membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length.
 - 2. All mechanical fastening shall be through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps.
 - 3. Immediately remove the plastic release liner.
 - 4. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
 - 5. After placement roll firmly to ensure a watertight seal.
 - 6. Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary.

- 7. Allow to dry and apply PREPRUFE[®] Tape LT (or HC in hot climates) centered over the lap edges and roll firmly.
- 8. Immediately remove printed plastic release liner from the tape.

3.05 WATERSTOP INSTALLATION

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
 - Secure ADCOR[®] hydrophilic waterstop using masonry nails 1¹/₂ in. 2 in. (40 mm 50 mm) long with a washer ³/₄ in. (20 mm) in diameter. Hilti EM6-20-12 FP8 shot fired fixings with ¹/₄ in. (6 mm) nuts and ³/₄ in. (20 mm) diameter washers may also be used. Fixings should be spaced at a maximum of 12 in. (300 mm) centers with a minimum spacing that ensures proper contact to substrate.
 - 2. On irregular concrete faces, or on vertical surfaces, apply a ¹/₂ in. (12 mm) bead of ADCOR[®] Adhesive as bedding for ADCOR[®] hydrophilic waterstop.
 - 3. ADCOR[®] hydriphilic waterstop joints should overlap a minimum of 4 in. (100 mm), ensuring full contact between jointed pieces.

3.06 PROTECTION

A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations

END OF SECTION 07_1324

SECTION 07_1326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes self-adhering, rubberized-asphalt sheet waterproofing.

1.3 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1. Provide plan and elevation drawings confirming locations, sizes and types of project specific sheet water proofing
- C. Product test reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer, approved by manufacturer to install manufacturer's products.
- B. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Environmental Conditions: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that does not remain watertight for period of five years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 RUBBERIZED-ASPHALT SHEET WATERPROOFING

SELF-ADHERING SHEET WATERPROOFING

- A. Rubberized-Asphalt Sheet: 60-mil- thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil- thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Hydrotech, Inc.; VM 75.
 - b. Carlisle Corporation, Carlisle Coatings & Waterproofing Div.; CCW 701.
 - c. Grace, W. R. & Co.; Bituthene.
 - d. T. C. Miradri; Miradri.
 - e. Pecora Corporation; Duramem 700-SM.
 - f. Polyguard Products, Inc.; Polyguard 650.

2.2 AUXILIARY MATERIALS

- A. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.
- B. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- C. Liquid Membrane: Elastomeric, two component, liquid, cold fluid applied, trowel grade or low viscosity.
- D. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- E. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dustfree, and dry substrates for waterproofing application.
- B. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- C. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
- D. Bridge and cover isolation joints, expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- E. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

SELF-ADHERING SHEET WATERPROOFING

F. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.2 APPLICATION

- A. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow to dry.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
- D. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- E. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic or sealant.
- F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 6 inches beyond repaired areas in all directions.
- G. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.
- H. Install protection course with butted joints over waterproofing membrane before starting subsequent construction operations.

3.3 PROTECTION AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected horizontal membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 1326

SECTION 07_1416 – FLUID-APPLIED WATERPROOFING

PART 1 — GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section.

1.02 SUMMARY

- A. The work of this section includes, but is not limited to, the following:
 - 1. Fluid applied waterproofing system
 - 2. Prefabricated drainage composite
 - 3. Protection board
- B. Related Sections: Other specification sections which directly relate to the work of this section include, but are not limited to, the following:
 - 1. Section 033000 Cast-In-Place Concrete
 - 2. Section 042000 Unit Masonry
 - 3. Section 076000 Flashing and Sheet Metal
 - 4. Section 079200 Joint Sealants
 - 5. Section 079500 Expansion Control
 - 6. Section 334600 Subdrainage

1.03 REFERENCE STANDARDS

- A. The following standards and publications are applicable to the extent referenced in the text.
- B. American Society for Testing and Materials (ASTM)
 - C 836 Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
 - C 898 Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane With Separate Wearing Course
 - D 412 Standard Test Methods for Rubber Properties in Tension
 - D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 - D 1644 Test Methods for Nonvolatile Content of Varnishes
 - D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - D 3767 Standard Practice for Rubber Measurements of Dimensions
 - D 5295 Preparation of concrete Surfaces for Adhered Membrane Waterproofing Systems

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations.
- B. Samples: Submit representative samples of the following for approval:
 - 1. Fluid applied membrane
 - 2. Protection board
 - 3. Prefabricated drainage composite

1.05 QUALITY ASSURANCE

- A. Installer: A firm which has at least 3 years experience in work of the type required by this section.
- B. Materials: Fluid applied waterproofing material shall be two part synthetic rubber based system free of isocyanates and bitumen. For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.
- C. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
 - 1. Do not double-stack pallets of waterproofing material on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
 - 2. Store drainage composite or protection board flat and off the ground. Provide cover on top and all sides.
 - 3. Protect waterproofing materials from freezing. In cool temperatures, store the material for several hours at room temperature to facilitate mixing and application.
- B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.07 PROJECT CONDITIONS

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.
- B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive membrane waterproofing.

1.08 WARRANTY

A. Fluid Applied Waterproofing Membrane: Provide written 5 year material warranty issued by the membrane manufacturer upon completion of the work.

PART 2 — PRODUCTS

2.01 MATERIALS

- A. Fluid Applied Waterproofing Membranes: Procor[®] fluid applied membranes by GCP Advanced Technologies Construction Products; a two part, self-curing, synthetic rubber based material. Procor[®] fluid applied membranes meet or exceed the performance requirements of ASTM C 836 and other ASTM standards as shown in the following table.
- B. Waterproofing Membrane Physical Properties:

PHYSICAL PROPERTIES FOR PROCOR® FLUID APPLIED MEMBRANES:

Property	Test Method	Typical Value
Color		terra cotta
Cured Film Thickness	ASTM D 3767 Method A	1.5 mm (0.060 in.) nominal
Solids Content	ASTM D 1644	100%
Flexibility, 180° bend over	ASTM D 1970	Unaffected
25 mm (1 in.) mandrel at		
32°C (-25°F)		
Elongation	ASTM D 412	500% minimum
Peel Adhesion to Concrete	ASTM D 903 Modified ¹	880 N/m (5 lbs/in.)

Footnote:

- 1. Procor waterproofing membrane is applied to concrete and allowed to cure. Peel adhesion of the membrane is measured at a rate of 50 mm (2 in.) per minute with a peel angle of 90° at room temperature.
 - C. Prefabricated Drainage Composite: Hydroduct[®] 660 Drainage Composite by GCP Advanced Technologies Construction Products for horizontal surfaces. Hydroduct 220 Drainage Composite by GCP Advanced Technologies Construction Products for all vertical surfaces. Drainage composite shall be designed to promote positive drainage while serving as a protection course.
 - D. Protection Board (only if prefabricated drainage composite is not used):

- 1. Asphalt Hardboard: A premolded semi-rigid protection board consisting of bitumen, mineral core and reinforcement. Provide 3 mm (0.125 in.) thick hardboard on horizontal surfaces not receiving steel reinforced slab. Where steel reinforcing bars are to be used, apply two layers of 3 mm (0.125 in.) thick hardboard or one layer of 6 mm (0.25 in.) thick hardboard.
- 2. Expanded Polystyrene Protection Board: 25 mm (1 in.) thick for vertical applications with the following characteristics.

Normal Density: 16 kg/m³ (1.0 lb/ft³)

Thermal Conductivity, K factor: 0.24 at 5°C (40°F), 0.26 at 24°C (75°F)

Thermal Resistance, R-Value: 4 per 25 mm (1 in.) of thickness.

- E. Waterstop: AdcorTM ES hydrophilic non-bentonite waterstop by GCP Advanced Technologies Construction Products for non-moving concrete construction joints.
- F. Miscellaneous Materials: Tape and other accessories specified or acceptable to manufacturer of fluid applied waterproofing membrane.

PART 3 — EXECUTION

3.01 EXAMINATION

A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 PREPARATION OF SUBSTRATES

A. Tie-holes and "bugholes" larger than 13 mm (1/2") in diameter or deeper than 3 mm (1/8"), or both, should be either pretreated with Procor or repaired with a lean concrete mix or Waterproofing Systems, for further details on substrate preparation.

Cracked, pitted, honeycombed or heavily bugholed surfaces can be filled by spraying from close in (10" to 12") but high material usage with result. Under these circumstances it may be more efficient to fill the surface with a parge coat of lean mortar mix before application of the Procor. It is also acceptable to fill in gaps with a compatible sealant or caulk.

- B. Cast-In-Place Concrete Substrates:
 - 1. Waterproofing application may commence as soon as the substrate can accept foot traffic. Surface shall be free of any visible water.
 - 2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
 - 3. Repair bugholes greater than 1/2" (13 mm) in depth and 1/4" (6 mm) in diameter deep and finish flush with surrounding surface.
 - 4. Remove scaling to sound, unaffected concrete and repair exposed area.
 - 5. Grind irregular construction joints to suitable flush surface.
- C. Masonry Substrates: Apply waterproofing over concrete block and brick with smooth trowel-cut mortar joints or parge coat.
- D. Plywood Substrates: Pretreat all plywood joints with 75mm (3 in.) wide, reinforced self-adhesive tape. Secure all fasteners.
- E. Related Materials: Treat joints and install flashing as recommended by waterproofing manufacturer.

3.03 INSTALLATION

- A. Refer to manufacturer's literature for recommendations on installation, including but not limited to, the following:
 - Apply minimum 1.5 mm (0.060 in.) in all areas to be waterproofed. Apply minimum 3 mm (0.120 in.) in
 - all detail areas.
 - 2. If area to be waterproofed is in direct sunlight and temperature is rising, apply "scratch coat" (a thin application of fluid applied waterproofing) prior to the full application of the waterproofing membrane.
 - 3. In applications where a minimum slope of 11 mm/m (0.13 in./ft) cannot be achieved, a two coat application of Procor membrane is recommended to achieve the total thickness.

4. Apply protection board and related materials in accordance with manufacturer's recommendations.

3.04 CLEANING AND PROTECTION

A. Remove any masking materials after installation. Clean any stains on materials which would be exposed in the

completed work.

B. Protect completed membrane waterproofing from subsequent construction activities as recommended by manufacturer.

END OF SECTION 07_1416

SECTION 07 2100 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
 - 1. 07_2614 Under-Slab Vapor Retarder

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Rigid board insulation in walls.
 - 2. Concealed building insulation.
 - 3. Exposed building insulation.
 - 4. Thermal insulation
 - 5. Sound insulation
 - 6. Vapor retarder

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

- 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
- 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Extruded-Polystyrene Rigid Board Insulation:
 - a. Tenneco Building Products.
 - b. Dow Chemical Company.
 - c. Owens Corning.
 - 2. Glass-Fiber Insulation:
 - a. CertainTeed Corporation.
 - b. Johns Manville Corporation.
 - c. Owens Corning.
 - d. Guardian Fiberglass.

2.2 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
- B. Extruded-Polystyrene Rigid Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:
 - 1. Type IV, 1.60 lb/cu. ft., unless otherwise indicated. Minimum thermal resistance aged R-value per inch shall be 5.0 at 75 degree F mean temperature.
- C. Sound Insulation: Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from glass, with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- D. Exterior Wall and Ceiling Thermal Insulation: Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with, FSK foil-scrim vapor-retarder membrane on one face; consisting of fibers manufactured from glass.
 - 1. Nominal density of 1.0 lb/cu.ft., thermal resistivity of 3.7 deg F x h x sq.ft/Btu x in. at 75 deg F.
 - 2. Combustion Characteristics: Passes ATM E 136.

2.3 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
- B. Fire-Retardant, Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nonwoven grid of nylon cord or polyester scrim and weighing not less than 22 lb/1000 sq. ft., with maximum permeance rating of 0.1317 perm and with flame-spread and smoke-developed indexes of not more than 5 and 60, respectively.
 - 1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Raven Industries Inc.; DURA-SKRIM 2FR.
 - b. Reef Industries, Inc.; Griffolyn T-55 FR.

2.4 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
 - 1. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
 - c. Gemco; Spindle Type.
 - 2. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - 3. Spindle: Copper-coated, low carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.
 - 4. Anchor Adhesives:
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Eckel Industries of Canada Limited; Stic-Klip Type S Adhesive.
 - c. Gemco; Tuff Bond Hanger Adhesive.
- B. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
 - 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- D. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
 - 1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - a. Do not compact or compress blankets into spaces they were not designed for, select and cut insulation blankets to conform to space required.
 - 3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping the stapling flanges to flanges of metal studs.
 - 4. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to produce airtight installation after concealing finish material is in place.
 - 5. Sound blankets without facing shall be selected to completely fill cavity fit tight and shall be support with wire

3.5 **PROTECTION**

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07_2100

SECTION 07_2500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Building wrap.
 - 2. Flexible flashing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 a. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap.
 - 2. Water-Vapor Permeance: Not less than 50 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).
- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.

- b. Grace Construction Products, a unit of W. R. Grace & Co. Conn.; Vycor Butyl Self Adhered Flashing.
- c. Protecto Wrap Company; BT-25 XL.
- d. Raven Industries Inc.; Fortress Flashshield.
- e. Advanced Building Products Inc.; Wind-o-wrap.
- f. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
- g. Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover sheathing with water-resistive barrier as follows:
 - 1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.
- B. Building Wrap: Comply with manufacturer's written instructions.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
 - 1. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
 - 2. Lap flashing over water-resistive barrier at bottom and sides of openings.
 - 3. Lap water-resistive barrier over flashing at heads of openings.

END OF SECTION 07_2500

SECTION 07_2600 - UNDER-SLAB VAPOR RETARDER FOR CONCRETE SLABS-ON-GRADE

PART 1 – GENERAL

1.1 SUMMARY

- A. Products Supplied Under This Section
 - 1. Vapor Retarder, seam tape, mastic, pipe boots for installation under concrete slabs.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Cast-in-place Concrete Section 03 3000
- B. Concrete Forming and Accessories Section 03 2000
- C. Earthwork for Building Construction Section 31_2311

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1.	ASTM E 96/ E96M-10	Standard Test Methods for Water Vapor Transmission of Materials
2.	ASTM E 154-08a	Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
3.	ASTM E 1643-11	Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
4.	ASTM E 1745-11	Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs

- B. American Concrete Institute (ACI)
 - 1. ACI 302.2R-06, Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.4 SUBMITTALS

- A. Quality Control / Assurance
 - 1. Comply with Section 01 33 00 Submittal Procedures.
 - 2. Independent laboratory test results showing compliance with ASTM & ACI Standards.
 - 3. Manufacturer's samples, literature
 - 4. Manufacturer's installation instructions for placement, seaming and pipe boot installation
- B. Delivery, Storage, and Handling
 - 1. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

UNDER-SLAB VAPOR RETARDER FOR CONCRETE SLABS-ON-GRADE

- 2. Store materials in a clean dry area in accordance with manufacturer's instructions.
- 3. Stack membrane on smooth ground or wood platform to eliminate warping.
- 4. Protect materials during handling and application to prevent damage or contamination.
- 5. Ensure membrane is stamped with manufacturer's name, product name and membrane thickness at intervals of no more than 85" (220 cm).
- C. Environmental requirements
 - 1. Product not intended for uses subject to abuse or permanent exposure to the elements.
 - 2. Do not apply on frozen ground.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Vapor Retarder (Performance-Based Specifications)
 - 1. Vapor Retarder must have the following qualities at minimum and meet floor finish manufacturer's warranty requirements.
 - a. Water Vapor Retarder ASTM E1745: Meets or exceeds Class A
 - b. Maximum Permeance ASTM E96: 0.03 Perms or as required to meet Flooring Manufacturer's Warranties.
 - c. Tensile Strength ASTM E154, Section 9: 45 LBS. Force/Inch
 - d. Puncture Resistance ASTM D1709, Method B.
 - e. Thickness of Retarder (plastic) ACI 302.1R-96: Not less than 15 mils
 - f. Material: Virgin Polyethylene or Polyolefin
 - 2. Vapor Retarder Products, may be by one of the following manufacturers or an approved equal.
 - a. Epro, <u>http://eproserv.com</u>
 - b. Fortifiber, <u>http://www.fortifiber.com</u>
 - c. Stego Industries, <u>http://www.stegoindustries.com</u>
 - d. W.R. Meadows, <u>http://www.wrmeadows.com</u>
 - e. Raven Industries, <u>http://www.vaporblock.com</u>
 - f. Reef Industries, <u>http://www.reefindustries.com</u>
 - g. Insulation Solutions, <u>http://www.insulationsolution.com</u>

2.2 ACCESSORIES

- A. Seam Tape
 - 1. Tape must have the following qualities:
 - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower
- B. Vapor Proofing Mastic
 - 1. Mastic must have the following qualities:
 - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower
- C. Pipe Boots
 - 1. Construct pipe boots from vapor Retarder material, pressure sensitive tape and/or mastic per manufacturer's instructions.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive membrane. Ensure compaction requirements have been completed and geotechnical firm has confirmed compaction requirements have been met. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 SURFACE PREPARATION

A. Prepare surfaces in accordance with manufacturers instructions.

3.3 INSTALLATION

- A. Install Vapor Retarder:
 - 1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
 - a. Unroll Vapor Retarder with the longest dimension parallel with the direction of the pour.
 - b. Lap Vapor Retarder over footings and seal to foundation walls.
 - **C.** Overlap joints 6 inches and seal with manufacturer's tape.
 - d. Seal all penetrations (including pipes) per manufacturer's instructions.
 - e. No penetration of the Vapor Retarder is allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas by cutting patches of Vapor Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION 07_2600

SECTION 07_4113 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Architectural pre-formed metal roofing system complete with clips, perimeter and penetration flashing, closures, gutters, and down spouts.
- B. Related Sections: Section(s) related to this section include:
 - A. 1 Section 05 5000 Metal Fabrications
 - B. Section 06 1000 Rough Carpentry
 - C. Section 07 2100 Batt Insulation
 - D. Section 07 2600 Under Slab Vapor Retarder
 - E. Section 07 6200 Sheet Metal Flashing and Trim

1.2 REFERENCES

A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:

- 1. ASTM A 792 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- 2. A653-03: Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by theHot-Dip Process.
- 3. D1056-00: Specification for Flexible Cellular Materials Sponge or Expanded Rubber.
- 4. D1970-01: Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
- 5. D3575-00e1: Standard Test Methods for Flexible Cellular Materials made from Olefin Polymers.
- 6. E1592-01: Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
- 7. E1646-95(2003): Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
- 8. E1680-95(2003): Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.
- 9. E1886-02: Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
- 10. E2140-01: Standard Test Method for Water Penetration of Metal Roof Panels Systems by Static Water Pressure Head.

C. Underwriters Laboratories (UL):

- 1. UL 263 Fire Tests of Building Construction and Materials.
- 2. UL 580 Tests For Uplift Resistance of Roof Assemblies.
- 3. UL 790 Standard Test Methods for Fire Tests of Roof Coverings.
- 4. UL 2218 Impact Resistance of Prepared Roof Covering Materials.

D. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "Architectural Sheet Metal Manual."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Conduct preinstallation meeting to clarify Project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.4 ACTION SUBMITTALS

- A. Product Technical Data: For each type of product required, including manufacturer's preparation recommendations, storage and handling requirements, and recommended installation methods.
- B. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of roof and wall panels, specified loads, flashings, roof curbs, vents, sealants, interfaces with all materials not supplied by the metal panel system manufacturer, and identification of proposed component parts and their finishes. Do not proceed with fabrication prior to approval of shop drawings.
- C. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of panel, trim, clip and fastener required.
- D. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
- E. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.
- F. Qualifications Statements: For manufacturer and installer. See Section 01_3300 Submittal Procedures, for submittal procedures.
- G. Shop drawings: Show roof panel system with flashings and accessories in plan and elevation; sections and details. Include metal thickness' and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations. Indicate relationships with adjacent and interfacing work. Shop drawings to be prepared by metal roof panel manufacturer.
- H. Design Test Reports.
- I. 1. Submit copies of design test reports for each of the performance testing standards 1 listed in specification section 1.7.
- J. 2. Test reports shall be performed by independent, accredited test in laboratories, and shall bear the seal of a registered professional engineer.
- K. Warranty: Provide unexecuted specimen warranty documents for each warranty as required in specification section 1.6.
- L. Samples

- a. Submit sample of panel section, at least 6" x 6" showing seam profile and also a sample of color selected.
- b. Submit sample of panel clip, gable clip, batten seam cap with sealant, and preformed metal and foam closures.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For installed products including maintenance methods and precautions against cleaning materials and methods detrimental to finishes and performance.

B. Warranty: Warranty documents required in this section.

1.6 MAINTENANCE MATERIAL

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 01 Closeout Submittals Section.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications:

- 1. Provider of advanced installer training.
- 2. Minimum of ten years experience in manufacturing metal roof systems.

3. Provider of products produced in a permanent factory environment with fixed roll-forming equipment.

B. Installer Qualifications:

At least five years experience in the installation of architectural metal roof panels.
 Experience on at least five projects of similar size, type and complexity as this Project that have been in service for a minimum of two years with satisfactory performance of the roof system.
 Employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated and who shall be supervised at all times when material is being installed.

E. Fire Resistance Ratings: Determined by testing identical products and assemblies according to UL 263 and UL 790 by a testing agency acceptable to authorities having jurisdiction.

- 1. Flame-Spread Index: 25 (Class A) or less.
- 2. Smoke-Developed Index: 450 or less.

1.8 DELIVERY, STORAGE AND HANDLING

A. General: Comply with manufacturer's current printed product storage recommendations.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage: Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel and trim or

flashing component. Tilt stack to drain in wet conditions. Remove strippable plastic film before storage under high-heat conditions. Store products in manufacturer's unopened packaging until just prior to installation.

D. Handling: Exercise caution in unloading and handling metal panel system to prevent bending, warping, twisting and surface damage.

1.9 WARRANTY

A. Special Exposed Panel Finish Warranty: Manufacturer's standard form PVDF (Fluorocarbon) System Warranty for film integrity, chalk rating and fade rating in which manufacturer agrees to repair or replace panels that show evidence of deterioration within specified warranty period.

1. Deterioration shall include but is not limited to:

a. Color fading of more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling or failure of paint to adhere to bare metal.

2. Warranty Period: Film integrity for 45 years and chalk and fade rating for 35 years from date of Substantial Completion.

3. Manufacturer's warranty may exclude surface deterioration due to physical damage and exposure to salt air environments.

B. Special Exposed Panel Finish Warranty: Manufacturer's standard form proprietary two coat roll coated System Warranty for film integrity, chalk rating and fade rating in which manufacturer agrees to repair or replace panels that show evidence of deterioration within specified warranty period.

1. Deterioration shall include but is not limited to:

a. Color fading of more than 5 Hunter units on vertical applications or more than 6 Hunter units on non-vertical applications when tested according to ASTM D 2244.b. Chalking in excess of a No. 8 rating on vertical applications or a No. 7 rating on non-vertical applications when tested according to ASTM D 4214.

c. Cracking, checking, peeling or failure of paint to adhere to bare metal.

d. Perforation.

2. Warranty Period: Film integrity for 45 years, chalk and fade rating for 30 years, and perforation for 25 years from date of Substantial Completion.

3. Manufacturer's warranty may exclude surface deterioration due to physical damage and exposure to salt air environments.

C. Special Warranty: Installer's standard form in which installer agrees to repair or replace standing seam panels that fail due to poor workmanship or faulty installation within the specified warranty period.

1. Warranty Period: 3 years from date of Substantial Completion.

1.10 DESIGN AND PERFORMANCE CRITERIA

A. Thermal Expansion and Contraction.

- 1. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, or reducing performance ability.
- 2. The design temperature differential shall be not less than +/- 220 degrees F.

- 3. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.
- B. Uniform Positive Load Capacity.
 - 1. Uniform positive load capacity shall be determined in accordance with AISI SG02-1.
 - 2. The installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 20 psf; Roof Snow Load of 85 psf.
 - 3. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.
- C. Wind Uplift Classification: The panel system shall be listed as a Class 90 windstorm rated system, as determined by UL 580.
- D. Fire Resistance Classification: The panel system shall be listed as a Class A fire rated system, as determined by UL 790.
- E. Air infiltration: The panel system shall be tested in accordance with ASTM E1680, and meet or exceed the following performance requirements:

Pressure	Area Leakage Rate	
1.57 PSF	0.0012 cfm/sq.ft.	
6.24 PSF	0.0001cfm/sq.ft.	
20.0 PSF	0.0011 cfm/sq.ft	

F. Static air pressure water infiltration: The panel system shall be tested in accordance with ASTM E1646, and meet or exceed the following performance requirements:

Pressure	Result	
5 Gal/Hr per S.F. and Static Air	No Leakage	
Pressure of 20.0 psf for 15 minutes		

- G. Static water pressure head water infiltration: The panel system shall be tested in accordance with ASTM E2140, and pass with no leakage. The test specimen must include a panel end lap condition and successfully withstand being submerged under 6" of water.
- H. Dynamic pressure water penetration: The panel system shall be tested in accordance with AAMA 501.1, and pass with no water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration

PART 2 - PRODUCTS

2.1 ARCHITECTURAL METAL ROOF PANELS

A. Basis of Design Product: Subject to compliance with requirements provide Metal Sales Manufacturing Corporation; Image II. Metal sales Manufacturing Corporation. (800) 406-7387, http://www.metalsales.us.com

B. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 012500 - "Substitution Procedures"

C. Product Options:

- 1. Panel Coverage: 16 inches.
- 2. Rib Height: 1 inch

3. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, AZ50 OR AZ55 coating designation, structural quality, Grade 50, 0.0236-inch (24 GA.) minimum thickness. 5. Minimum Poof Slope Capability: 3:12 over solid substrate

5. Minimum Roof Slope Capability: 3:12 over solid substrate.

- 6. Side Lap: Snap seamed.
- 7. Attachment: Concealed direct fastened panel.
- 8. Application: Designed for application over solid substrate.
- 9. Panel Surface Configuration: Striations.
- 10. Surface Finish: PVDF (Kynar 500 or Hylar 5000)
- 11. Color: As selected by Architect from manufacturer's standard colors.
- 12. Fire Resistance Rating: Comply with UL 263 and UL 790 Class A Fire Resistance Ratings.
- 13. Impact Resistance: Comply with UL 2218, Class 4.
- 14. Water Infiltration: No leakage when tested according to Florida Building Code TAS 100.
- 15. Wind Uplift Resistance: Comply with UL 580, Class 90 Wind Uplift, Construction #529.
- D. Performance Criteria:
 - 1. Wind Uplift Resistance: Class 90
 - 2. Structural Performance:
 - a) Uniform positive load capacity shall be determined in accordance with AISI SG02-1.
 - b) The installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 20 psf; Roof Snow Load of 85 psf.
 - c) Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.

2.2 FIELD-INSTALLED THERMAL INSULATION

A. General: Refer to and coordinate with requirements in Division 07 - Thermal Insulation.

2.3 UNDERLAYMENT MATERIALS

A. General: Shall be applied over entire roof area

B. Products: Dry-Dek Ice and Water

2.5 ACCESSORIES

- A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fascia, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
- 2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closedcell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- 3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum **0.018 inch** thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

- C. Gutters: Formed from same material roof panels. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match **metal roof panels**.
- D. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual". Finish downspouts to match gutters.
- E. Snow Guards

2.6 SOURCE QUALITY CONTROL

A. Source: Obtain architectural metal roof panels, trim and other accessories from a single manufacturer.

B. Quality Control: Obtain architectural metal roof panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. At least five years experience in the installation of architectural metal roof panels.
- B. Experience on at least five projects of similar size, type and complexity as this Project that have been in service for a minimum of two years with satisfactory performance of the roof system.
- C. Employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated and who shall be supervised at all times when material is being installed.

3.2 PREPARATION

A. Substrate Board: Install substrate boards over roof deck and sheathing over entire roof surface using recommended fasteners.

B. Miscellaneous Framing: Install furring, eave angles, subpurlins, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Dry-Dek Ice and Water

B. Install flashing in compliance with requirements in Division 07 Section "Sheet Metal Flashing and Trim."

3.4 THERMAL INSULATION INSTALLATION

A. Board Insulation: <**Insert requirements.**> Comply with installation requirements in Division 07 Section "Thermal Insulation."

3.5 ARCHITECTURAL METAL ROOF PANEL INSTALLATION

A. General: Comply with panel manufacturer's installation instructions including but not limited to special techniques, interface with other work, and integration of systems.

B. Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and using proper fasteners as recommended by panel manufacturer.

C. Tolerances: < Insert requirements>.

3.6 ACCESSORY INSTALLATION

A. General: Install accessories using techniques recommended by manufacturer and which will assure positive anchorage to building and weather tight mounting. Provide for thermal movement. Coordinate installation with flashings and other components.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and the SMACNA "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units to true level. Install work with laps, joints, and seams that will be permanently watertight.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: If requested by Owner, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

1. Site Visits: < Insert requirements for site visits.>

3.8 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Repair or replace any installed products that have been damaged.

C. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance.

D. Remove and lawfully dispose of construction debris from Project site.

3.9 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION 07_4113

SECTION 07_4610- SIDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fiber cement lap siding, panels, shingle, trim, fascia, moulding and accessories, James Hardie HZ5 Engineered for Climate Siding.
- B. Factory-finished fiber cement lap siding, panels, single, trim, fascia, moulding and accessories, James Hardie HZ5 Engineered for Climate Siding.

1.2 RELATED SECTIONS

- A. Section 05400 Light Gage Metal Framing: Wall framing and bracing.
- B. Section 06100 Rough Carpentry: Wood framing and bracing.
- C. Section 06100 Rough Carpentry: Sheathing.
- D. Section 07210 Insulation: Exterior wall insulation.

1.3 REFERENCES

- A. ASTM C1186 Standard Specification for Flat Fiber-Cement Sheets
- B. ASTM D3359 Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.
- C. ASTM E136 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

WOOD FLOORING

- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

- A. Product Warranty: Limited, non-pro-rated product warranty.
 - 1. HardiePlank HZ5 lap siding for 30 years.
 - 2. HardiPanel HZ5 vertical siding for 30 years.
 - 3. HardieSoffit HZ5 panels for 30 years.
 - 4. HardieShingle HZ5 siding for 30 years.
 - 5. Artisan HZ5 lap siding for 30 years.
- B. Product Warranty: Limited, product warranty.
 - 1. HardieTrim HZ and HZ5 boards for 15 years.
- C. Finish Warranty: Limited product warranty against manufacturing finish defects.
 - 1. When used for its intended purpose, properly installed and maintained according to James Hardie's published installation instructions, James Hardie's ColorPlus finish with ColorPlus Technology, for a period of 15 years from the date of purchase: will not peel; will not crack; and will not chip. Finish warranty includes the coverage for labor and material.
- D. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: James Hardie Building Products, Inc., which is located at: 26300 La Alameda Suite 400; Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Tel: 949-367-4980; Email: request info (info@jameshardie.com); Web: www.jameshardiecommercial.com
- B. Substitutions: Not permitted.
- C. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600.

2.2 SIDING

- A. HardiePlank HZ5 lap siding, HardiPanel HZ5 vertical siding, HardieSoffit HZ5 panels and HardieShingle HZ5 siding requirement for Materials:
 - 1. Fiber-cement Siding complies with ASTM C 1186 Type A Grade II.
 - 2. Fiber-cement Siding complies with ASTM E 136 as a noncombustible material.
 - 3. Fiber-cement Siding complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
 - 4. CAL-FIRE, Fire Engineering Division Building Materials Listing Wildland Urban Interface (WUI) Listed Product.
 - 5. National Evaluation Report No. NER 405 (BOCA, ICBO, SBCCI, IBC, IRC).
 - 6. City of Los Angeles, Research Report No. 24862.
 - 7. Miami Dade County, Florida Notice of Acceptance 07-0418.04.
 - 8. US Department of Housing and Urban Development Materials Release 1263d.
 - 9. California DSA PA-019.
 - 10. City of New York M EA 223-93-M.
 - 11. Florida State Product Approval FL889.
 - 12. Texas Department of Insurance Product Evaluation EC-23.
- B. Artisan HZ5 lap siding requirement for Materials:
 - 1. Fiber-cement Siding complies with ASTM C 1186 Type A Grade II.
 - 2. Fiber-cement Siding complies with ASTM E 136 as a noncombustible material.
 - 3. Fiber-cement Siding complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
 - 4. Warnock Hersey Product Listing.
 - 5. CAL-FIRE, Fire Engineering Division Building Materials Listing Wildland Urban Interface (WUI) Listed Product.
 - 6. Florida State Product Approval FL10477.
 - 7. Miami Dade County, Florida Notice of Acceptance 08-0514.11.
 - 8. Texas Department of Insurance Product Evaluation EC-55.
 - 9. Manufacturer's Technical Data Sheet.
- C. Lap Siding: Artisan HZ5 Lap Siding as manufactured by James Hardie Building Products, Inc.
 - 1. Type: Smooth 5-1/4 inches (133 mm) with 4 inches (102 mm) exposure.
 - 2. Type: Smooth 7-1/4 inches (184 mm) with 6 inches (152 mm) exposure.
 - 3. Type: Smooth 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.
 - 4. Type: Texture 5-1/4 inches (133 mm) with 4 inches (102 mm) exposure.
 - 5. Type: Texture 7-1/4 inches (184 mm) with 6 inches (152 mm) exposure.
 - 6. Type: Texture 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.
- D. Lap Siding: HardiePlank HZ5 Lap siding with a sloped top, beveled drip edge and nailing line as manufactured by James Hardie Building Products, Inc.
 - 1. Type: Smooth 5-1/4 inches (133 mm) with 4 inches (102 mm) exposure.
 - 2. Type: Smooth 6-1/4 inches (159 mm) with 5 inches (127 mm) exposure.
 - 3. Type: Smooth 7-1/4 inches (184 mm) with 6 inches (152 mm) exposure.
 - 4. Type: Smooth 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.
 - 5. Type: Smooth 9-1/4 inches (235 mm) with 8 inches (203 mm) exposure.
 - 6. Type: Smooth 12 inches (305 mm) with 10-3/4 inches (273 mm) exposure.
 - 7. Type: Select Cedarmill 5-1/4 inches (133 mm) with 4 inches (102 mm) exposure.
 - 8. Type: Select Cedarmill 6-1/4 inches (159 mm) with 5 inches (127 mm) exposure.
 - 9. Type: Select Cedarmill 7-1/4 inches (184 mm) with 6 inches (152 mm) exposure.
 - 10. Type: Select Cedarmill 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.
- E. Lap Siding: HardiePlank HZ5 Lap siding as manufactured by James Hardie Building Products, Inc.
 - 1. Type: Beaded Smooth 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.
 - 2. Type: Beaded Cedarmill 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.

- F. Vertical Siding: HardiePanel HZ5 siding as manufactured by James Hardie Building Products, Inc.
 - 1. Type: Smooth Vertical siding panel 4 feet by 8 feet (1219 mm by 2438 mm).
 - 2. Type: Smooth Vertical siding panel 4 feet by 9 feet (1219 mm by 2743 mm).
 - 3. Type: Smooth Vertical siding panel 4 feet by 10 feet (1219 mm by 3048 mm).
 - 4. Type: Cedarmill Vertical siding panel 4 feet by 8 feet (1219 mm by 2438 mm).
 - 5. Type: Cedarmill Vertical siding panel 4 feet by 9 feet (1219 mm by 2743 mm).
 - 6. Type: Cedarmill Vertical siding panel 4 feet by 10 feet (1219 mm by 3048 mm).
 - 7. Type: Stucco Vertical siding panel 4 feet by 8 feet (1219 mm by 2438 mm).
 - 8. Type: Stucco Vertical siding panel 4 feet by 9 feet (1219 mm by 2743 mm).
 - 9. Type: Stucco Vertical siding panel 4 feet by 10 feet (1219 mm by 3048 mm).
 - 10. Type: Sierra 8 inches (203 mm) Vertical siding panel 4 feet by 8 feet (1219 mm by 2438 mm).
 - 11. Type: Sierra 8 inches (203 mm) Vertical siding panel 4 feet by 9 feet (1219 mm by 2743 mm).
 - 12. Type: Sierra 8 inches (203 mm) Vertical siding panel 4 feet by 10 feet (1219 mm by 3048 mm).
- G. Shingle Siding: HardieShingle HZ5 siding as manufactured by James Hardie Building Products, Inc.
 - 1. Type: HardiShingle Individual Shingles 6 inches (152 mm) wide by 18 inches (457 mm) high with 8 inches (203 mm) exposure.
 - 2. Type: HardiShingle Individual Shingles 8 inches (203 mm) wide by 18 inches (457 mm) high with 8 inches (203 mm) exposure.
 - 3. Type: HardiShingle Individual Shingles 12 inches (305 mm) wide by 18 inches (457 mm) high with 8 inches (203 mm) exposure.
 - 4. Type: HardieShingle Straight-Edge Notched Panel 48 inches (1219 mm) wide by 16 inches (406mm) high with 7 inches (178 mm) exposure.
 - 5. Type: HardieShingle Staggered-Edge Notched Panel 48 inches (1219 mm) wide by 16 inches (406mm) high with 7 inches (178 mm) exposure.
 - 6. Type: HardieShingle Half Round Notched Panel 48 inches (1219 mm) wide by 19 inches (483mm) high with 7 inches (178 mm) exposure.
- H. Trim:
 - 1. HardieTrim HZ5 boards and HardieTrim HZ boards as manufactured by James Hardie Building Products, Inc.
 - 2. HardieTrim HZ5 Fascia boards as manufactured by James Hardie Building Products, Inc.
 - 3. HardieTrim HZ5 Crown moulding manufactured by James Hardie Building Products, 1nc.
 - 4. Artisan HZ5 Accent trim as manufactured by James Hardie Building Products, Inc.

2.3 FASTENERS

- A. Wood Framing Fasteners:
 - 1. Wood Framing: 4d common corrosion resistant nails.
 - 2. Wood Framing: 6d common corrosion resistant nails.
 - 3. Wood Framing: 8d box ring common corrosion resistant nails.
 - 4. Wood Framing: 0.089 inch (2.2 mm) shank by 0.221 inch (5.6 mm) head by 2 inches (51 mm) corrosion resistant siding nails.
 - 5. Wood Framing: 0.093 inch (2.4 mm) shank by 0.222 inch (5.6 mm) head by 2 inches (51 mm) corrosion resistant siding nails.
 - 6. Wood Framing: 0.093 inch (2.4 mm) shank by 0.222 inch (5.6 mm) head by 2-1/2 inches (64 mm) corrosion resistant siding nails.
 - 7. Wood Framing: 0.091 inch (2.3 mm) shank by 0.221 inch (5.6 mm) head by 1-1/2 inches (38 mm) corrosion resistant siding nails.
- 8. Wood Framing: 0.091 inch (2.3 mm) shank by 0.225 inch (5.7 mm) head by 1-1/2 inches (38 mm) corrosion resistant siding nails.
- 9. Wood Framing: 0.121 inch (3 mm) shank by 0.371 inch (9.4 mm) head by 1-1/4 inches (32 mm) corrosion resistant roofing nails.
- 10. Wood Framing: No. 11 gauge 1-1/4 inches (32 mm) corrosion resistant roofing nails.
- 11. Wood Framing: No. 11 gauge 1-1/2 inches (38 mm) corrosion resistant roofing nails.
- 12. Wood Framing: No. 11 gauge 1-3/4 inches (44 mm) corrosion resistant roofing nails.
- B. Metal Framing:
 - 1. Metal Framing: 1-1/4 inches (32 mm) No. 8-18 by 0.375 inch (9.5 mm) head self-drilling, corrosion resistant S-12 ribbed buglehead screws.
 - 2. Metal Framing: 1-5/8 inches (41 mm) No. 8-18 by 0.323 inch (8.2 mm) head self-drilling, corrosion resistant S-12 ribbed buglehead screws.
 - 3. Metal Framing: 1 inch (25 mm) No. 8-18 by 0.323 inch (8.2 mm) head self-drilling, corrosion resistant ribbed buglehead screws.
 - 4. Metal Framing: 1 inch (25 mm) No. 8-18 by 0.311 inch (7.9 mm) head self-drilling, corrosion resistant S-12 ribbed buglehead screws.
 - 5. Metal Framing: 1.5 inch (38mm) [AGS-100] .100 inches by 25 inches (2540 mm by 635 mm) ET&F Pin or equivalent pneumatic fastener.
- C. Masonry Walls (CMU):
 - 1. Masonry Walls: Aerico Stud Nail, ET&F ASM No.-144-125, 0.14 inch (3.6 mm) shank by 0.30 inch (7.6 mm) head by 2 inches (51 mm) long corrosion resistant nails.

2.4 FINISHES

- A. Factory Primer: Provide factory applied universal primer.
 - 1. Primer: Factory primed by James Hardie.
 - 2. Topcoat: Refer to Section 09900 and Exterior Finish Schedule.
- B. Factory Finish: Refer to Exterior Finish Schedule.
 - 1. Product: ColorPlus Technology by James Hardie.
 - 2. Definition: Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
 - 3. Process:
 - a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
 - b. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
 - 4. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
 - 5. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.
- C. Factory Finish Color for Trim, Soffit and Siding Colors:
 - 1. Alpine Frost JH50-10.
 - 2. Arctic White JH10-20.
 - 3. Autumn Tan JH20-20.
 - 4. Boothbay Blue JH70-20.
 - 5. Chestnut Brown JH80-30.
 - 6. Cobble Stone JH40-10.
 - 7. Countrylane Red JH90-20.
 - 8. Evening Blue JH70-30.
 - 9. Frosted Green JH60-20.
 - 10. Harris Cream JH80-10.

- 11. Heathered Moss JH50-20.
- 12. Iron Gray JH90-30.
- 13. Khaki Brown JH20-30.
- 14. Light Mist JH70-10.
- 15. Monterey Taupe JH40-20.
- 16. Mountain Sage JH50-30.
- 17. Navajo Beige JH30-10.
- 18. Parkside Pine JH60-30.
- 19. Sail Cloth JH20-10.
- 20. Sandstone Beige JH30-20.
- 21. Soft Green JH60-10.
- 22. Timber Bark JH40-30.
- 23. Traditional Red JH90-10.
- 24. Tuscan Gold JH80-20.
- 25. Woodland Cream JH10-30.
- 26. Woodstock Brown JH30-30.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Nominal 2 inch by 4 inch (51 m by 102 mm) wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive barriers or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
 - 1. Install water-resistive barriers and claddings to dry surfaces.
 - 2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
 - 3. Protect siding from other trades.
- D. Minimum 20 gauge 3-5/8 inch (92 mm) C-Stud 16 inches maximum on center or 16 gauge 3-5/8 inches (92 mm) C-Stud 24 inches (610 mm) maximum on center metal framing complying with local building codes, including the use of water-resistive barriers and/or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
 - 1. Install water-resistive barriers and claddings to dry surfaces.
 - 2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
 - 3. Protect siding from other trades.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install a water-resistive barrier is required in accordance with local building code requirements.
- D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

- E. Install Engineered for ClimateTM HardieWrapTM weather barrier in accordance with local building code requirements.
- F. Use HardieWrapTM Seam Tape and joint and laps.
- G. Install HardieWrapTM flashing, and HardieWrapTM Flex Flashing

3.3 INSTALLATION - HARDIEPLANK HZ5 LAP SIDING AND ARTISAN HZ5 LAP SIDING

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.
- C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- D. Align vertical joints of the planks over framing members.
- E. Maintain clearance between siding and adjacent finished grade.
- F. Locate splices at least one stud cavity away from window and door openings.
- G. Wind Resistance: Where a specified level of wind resistance is required Hardieplank lap siding is installed to framing members and secured with fasteners described in Table No. 2 in National Evaluation Service Report No. NER-405.
- H. Locate splices at least 12 inches (305 mm) away from window and door openings.

3.4 INSTALLATION - HARDIEPANEL HZ5 VERTICAL SIDING

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Block framing between studs where HardiePanel siding horizontal joints occur.
- C. Install metal Z flashing and provide a 1/4 inch (6 mm) gap at horizontal panel joints.
- D. Place fasteners no closer than 3/8 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.
- E. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- F. Maintain clearance between siding and adjacent finished grade.
- G. Specific framing and fastener requirements refer to Tables 2 and 3 in National Evaluation Service Report No. NER-405.
- H. Factory Finish Touch Up: Apply touch up paint to cut edges in accordance with manufacturer's printed instructions.
 - 1. Touch-up nicks, scrapes, and nail heads in pre-finished siding using the manufacturer's touch-up kit pen.
 - 2. Touch-up of nails shall be performed after application, but before plastic protection wrap is removed to prevent spotting of touch-up finish.
 - 3. Use touch-up paint sparingly. If large areas require touch-up, replace the damaged area with new pre-finished siding. Match touch up color to siding color through use of manufacturer's branded touch-up kits.

3.5 INSTALLATION - HARDIE HZ5 SHINGLESIDE CLADDING

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Substrate: Install a minimum 7/16 inch (11 mm) thick OSB wall sheathing or equivalent braced walls complying with applicable building codes.
- C. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall.
- D. Maintain clearance between siding and adjacent finished grade.
- E. Apply starter course of 10 inches (254 mm) shingles or 9-1/2 inches (241 mm) lap siding overlapping the starter strip.
- F. Apply subsequent courses horizontally with a minimum 10 inch overlap at the top and a minimum 2 inch (51 mm) side lap. The bottom edge of the first two courses overlaps the starter strip.
- G. Fasten between 1/2 inch (13 mm) and 1 inch (25 mm) in from the side edge and between 8-1/2 inches (216 mm) and 9 inches (229 mm) up from the shingle bottom edge.
- H. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- I. Ensure vertical joints of overlapping shingle course do not align.
- J. Wind Resistance: Where a specified level of wind resistance is required, Hardie Shingle siding is installed to substrate and secured with a minimum two fasteners described in Table No. 6, 7 and 8 in National Evaluation Service Report No. NER-405.

3.6 INSTALLATION - HARDIETRIM HZ5 BOARDS

- A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
- B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
- C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.
- D. Maintain clearance between trim and adjacent finished grade.
- E. Trim inside corner with a single board trim both side of corner.
- F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.
- G. Allow 1/8 inch gap between trim and siding.
- H. Seal gap with high quality, paint-able caulk.
- I. Shim frieze board as required to align with corner trim..
- J. Fasten through overlapping boards. Do not nail between lap joints.

WOOD FLOORING

- K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.
- L. Shim frieze board as required to align with corner trim.
- M. Install HardieTrim Fascia boards to rafter tails or to sub fascia.

3.7 FINISHING

- A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.
- B. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.8 **PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07_4610

SECTION 07_6200 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Flashings, counterflashings, sheet metal roofing flashings, through-wall scuppers, edge strips, formed wall flashing and trim and other fabricated sheet metal items.

1.03 RELATED SECTIONS

- A. Section 07 6100 Standing Seam Roof Panels.
- B. Section 07 7200 Roof Accessories
- C. Section 07 9213 Joint Sealants.
- E. Section 09 9100 Painting: Field painting.
- E. Section 06 1000 Rough Carpentry

1.04 REFERENCES

- A. ASTM A 653/A 653M Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1997.
- B. ASTM B 32 Standard Specification for Solder Metal; 1996.
- C. ASTM D 2178 Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 1997a.
- D. ASTM D 4586 Standard Specification for Asphalt Roof Cement, Asbestos-Free; 1993.
- E. SMACNA (ASMM) Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2003, Sixth Edition.
- F. NRCA The NRCA Architectural Sheet Metal and Metal Roofing Manual, Latest Editions.

1.05 SUBMITTALS

- A. See Section 01 3300 Submittal Procedures, for submittal procedures.
- B. Shop Drawings: Provide for all shop and pre-manufactured fabricated items. Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details. Submit color chart for pre-finished materials.
 - 1. Submit drawings for coordination and verification of all saddle flashing details at all low/high wall intersections as indicated in drawings.

- 2. provide drawings with dimensions for each type and size of through-wall roof scupper for locations shown on drawings.
- C. Submit roof manufacturer's certification that metal fasteners and sealants are acceptable to roof manufacturer.
- D. Product Data Sheets on all products
- E. For fasteners that are to penetrate into, or through, pressure preservative treated lumber use stainless steel, hot dipped galvanized coated or provide certification from manufacturer that coating is compatible with preservative used for wood treatment.
- F. Submit copies of all warranties.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual and The NRCA Architectural Sheet Metal and Metal Roofing Manual requirements and standard details and Manufacturer's requirements, except as otherwise indicated.
- B. Install all sheet metal so as not to allow water infiltration into building.
- C. Prevent contact with materials which may cause discoloration or staining.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials which may cause discoloration or staining.

1.08 WARRANTIES:

A. 20 year coating warranties on all coated metals

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Pre-Finished Aluminum
 - 1. 5005-h34 alloy aluminum
 - 2. minimum thickness 0.050 mill finish with AA-M12C22A41, AAMA 611, Architectural Class 1 Clear Anodic Coating. Or match coping metal finish as noted in drawings
- B. Membrane coated metal by roof system manufacturer is to be used as shown in plans and roof membrane specification section.

2.02 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers. For fasteners that are to penetrate into, or through, pressure preservative treated lumber use stainless steel fasteners, hot dipped galvanized coated fasteners or coated fastener that is certified by manufacturer that coat is compatible with preservative used for wood treatment.

- B. Underlayment:
 - 1. ASTM D 2178, glass fiber roofing felt.
 - 2. Self adhering polymer modified bituminous sheet equal to W. R. Grace Ice and Water Shield
- C. Primer: Zinc chromate type.
- D. Protective Backing Paint: Zinc chromate alkyd.
- E. Sealant:
 - 1. One-part polyure than caulking where the caulking is exposed to sunlight and used as a fill between components.
 - 2. Non-skinning butyl caulking where caulking is required between components and is placed in compression and is not exposed to sunlight.
- F. Plastic Cement: ASTM D 4586, Type I.
- G. Solder: ASTM B 32; Sn50 (50/50) type.

PART 3 FABRICATION

3.01 GENERAL 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.
- B. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- C. Fabricated corners:
 - 1. Metal corners are to be soldered/welded water tight at curb metal cover flashings.
 - 2. Other, metal corners are to be folded and mitered together with the folded metal sealed water tight with sealant between the folds. Seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward ¹/₄" or ¹/₂"inch (6 mm) and hemmed to form drip.
- G. All metal roof counterflashings are to be 2-piece (reglet with flashing insert). All metal flashing and reglet corners are to be mitered, folded, caulked and pop riveted in a watertight manner. The reglet/receiver mitered corners are to be fabricated with legs no longer than 18".
- H. Fabricate saddle flashings from two components as shown in Drawings, tape and seal all joints prior to installation to prevent moisture from penetrating all low/high wall intersection conditions.
- I. Install through-wall scuppers with mechanical fasteners through extended plates and roof flange to blocking and frame of wall. Protect dissimilar metals from making contact with each other.
 - 1. Coordinate scupper details with roof system manufacturer.

3.02 THROUGH-WALL ROOF SCUPPER

- A. Custom factory formed galvanized sheet metal through-wall scupper shall meet shapes and profiles shown on drawings and shall be manufactured to fit wall depths of varying sizes where indicated in drawings
 - 1. fabricate scupper assemblies from one piece of .050 gauge aluminum sheet with minimum 8" long extended plates either side and roof flange to be flashed to roof membrane at inside of parapet
 - a. weld seams of flange and extended plates water-tight
 - b. minimum opening dimensions shall be 4-1/2" high by 14" wide
 - c. Clear anodized aluminum, color to match coping flashing system
 - 2. Extend outlet opening not less than 8 inches from face of finished wall with integral drip edge
 - 3. Slope outlet for positive drainage toward outside of building.

PART 4 EXECUTIONS

4.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

4.02 **PREPARATION**

- A. Install starter, edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint

4.03 GENERAL INSTALLATION

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA and NRCA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall opening components such as windows, doors and louvers.
- B. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- C. Apply plastic cement compound between asphalt primed metal flashings, felt flashings and per NRCA standards.
- D. Fit flashings tight in place. Make mitered corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

4.04 COUNTERFLASHING INSTALLATION

- A. All metal roof counterflashings are to be 2-piece (reglet/receiver with flashing insert). Counterflashings attached to metal and where slip metal is needed at mechanical curbs, one (1) piece may be used unless Drawings indicate otherwise.
- B. Masonry and saw cut reglets: Insert masonry reglets to form tight fit. Secure saw cut reglets in place with appropriate wedges installed. Seal joint with one part polyurethane caulking.
- C. Surface mounted flashing receiver: Set receiver into non-skinning butyl caulk and fasten reglet to wall 12" O.C through butyl caulk. Seal top of receiver with one part polyurethane caulking. For stucco stop type reglet: fasten reglet to wall 12" O.C.

- D. All metal flashing receiver and reglet lap joints are to be lapped 3" and are to be caulked water tight with polyurethane caulking between the two pieces. The two pieces are to fit flush with one another. Wind clips 1" wide are to be installed spaced approximately 3'4" O.C.
- E. All metal flashing and reglet corners are to be mitered, folded, caulked and pop riveted in a watertight manner. The reglet/receiver mitered corners are to be fabricated with legs no longer than 24".
- F. When masonry and stucco stop reglets are to be installed by other trades, insure that they are fully informed on installation requirements.

END OF SECTION 07_6200

SECTION 07_7200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Roof hatches.
 - 2. Roof mounted pipe supports.
 - 3. Pre-Cast concrete splash blocks

1.3 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated.
- B. Shop Drawings: Show fabrication and installation details for roof accessories.

1.4 QUALITY ASSURANCE

A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers listed in other Part 2 articles.

2.2 METAL MATERIALS

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coated.
 - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coated.
 - 2. Factory-Prime Coating: Where painting after installation is indicated, provide pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of 0.2 mil.

2.3 ROOF HATCHES

- A. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated double-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers that may be incorporated into the work include, but are not limited to the following.
 - a. Babcock-Davis; a Cierra Products Inc. Company.
 - b. Bilco Company (The).
 - c. Dur-Red Products.
 - d. Nystrom, Inc.
 - 2. Loads: Fabricate roof hatches to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loads.
 - 3. Type and Size: Single-leaf lid, 36 by 36 inches unless otherwise indicated on Drawings.
 - 4. Curb and Lid Material: Galvanized steel sheet, 0.079 inch. Prime paint finish.
 - 5. Insulation: Manufacturers standard insulation board.
 - 6. Interior Lid Liner: Manufacturer's metal liner of same material and finish as outer metal lid.
 - 7. Exterior Curb Liner: Manufacturer's metal liner of same material and finish as metal curb.
 - 8. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
 - 9. Fabricate units to minimum height of 12 inches, unless otherwise indicated.
 - 10. Hardware: Galvanized steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
 - 11. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.
 - 12. Safety Railing System: Manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation.

2.4 ROOF MOUNTED PIPE SUPPORTS

- A. Roof Mounted Pipe Supports: Provide rooftop supports designed to support variety of pipe and tube sizes with full line of clip or bolt on accessories provided by a single manufacturing source, to rest on top of roof membrane surface. Supports shall be compatible with roof surface membrane and shall provide dampening of vibration. Spacing of supports shall be as recommended by manufacturer.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers that may be incorporated into the work include, but are not limited to the following.
 - a. Firestone Red Shield Pipe Support System.
 - 2. Minimum Performance:
 - a. Base: injection molded high density high impact polypropelene withUV-inhibitors and antioxidants, min. base density 55.8 lb/cu.ft
 - b. Strut Frame: size as required by size and loading
 - c. Form: roll-formed 3 sided or tubular shape perforated on three sides
 - d. Material: 12 gage stainless steel mill finish
 - e. Accessories: Clamps bolts washers etc. stainless steel mill finish
 - f. Rollers, clevis hangers, or band hangers must allow for expansion and contraction without movement of the bases or framing

2.5 SPLASH BLOCKS

A. Pre-manufactured Splash Blocks: Commercial precast concrete type, of size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Install roof accessories to fit substrates and to result in watertight performance.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
- D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 - 1. Pipe supports shall be spaced according to loads imposed as recommended by manufacturer, and each support shall rest on a piece of TPO walk-pad membrane cut to be minimum 2 inches larger than pipe support stand all around perimeter.
- E. Seal joints with elastomeric sealant as required by manufacturer of roof accessories.

END OF SECTION 07_7200

SECTION 07_7253 - STANDING SEAM SNOW FENCE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Standing Seam Snow Fences.

1.2 RELATED SECTIONS

A.07_4100 – Metal Roof Panels

B.07_6100 – Sheet Metal Roofing

C.07_6113 - Standing Seam Metal Roofing

1.3 REFERENCES

A. NRCA Roofing and Waterproofing Manual.

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: TRA Snow and Sun, which is located at: 1657 South 580 East, PO Box 682; American Fork, UT 84003; Toll Free Tel: 800-606-8980; Tel: 801-756-8666; Email:

info@trasnowandsun.com; Web: www.trasnowandsun.com

B.Reference Project #: 20181005-TA Taos Ski Valley

C. Substitutions: Not Permitted.

2.2 STANDING SEAM SNOW FENCES

A. PRODUCTS: As manufactured by TRA Snow and Sun.

- 1. Application: Used on standing seam metal roof panels
- 2. Panel Seam Type or Profile: Metal Sales Image II.
- 3. Model: C-2-3-Z, 3 rail, for standing seam metal, accepts 3/4 inch (19 mm) pipe.
- 4. Materials: Steel, 3/16 inch (4.75 mm) (ASTM A36).
- 5. Finish: Powder coating color as selected by Architect from TRA Standard colors.

B.COMPOMENTS:

1. Ice Flag: 3 Rail, custom sized to fit fence, attaches to fence rail to prevent snow and ice from sliding beneath rail.

2. Pipe: 3/4 inch (19 mm) pipe, 10-foot (3050 mm) sections.

3. Unions: Pipe union to allow the joining of two pipe sections; one included per pipe section.

4. Collars: 3/4 inch (19 mm) shaft collar; 1018 Steel, Stainless Steel (Type 303); Prevents lateral pipe movement.

5. End Caps: 3/4 inch (19 mm) snap in fitting; Zinc Plated Steel; finished pipe ends.

PART 3 EXECUTION

3.1 SNOW FENCE INSTALLATION

A. Snow Fence: Install in accordance with manufacturer's installation instructions and engineered layout charts.

END OF SECTION 07_7253

SECTION 07_8413 - FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through the following fireresistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - 1. Floors.
 - 2. Roofs.
 - 3. Walls and partitions.
 - 4. Smoke barriers.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
 - 1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
 - 2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
 - 3. Fire-resistance-rated floor assemblies.
 - 4. Fire-resistance-rated roof assemblies.
- B. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.4 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product indicated.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
- D. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
 - 1. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:.
 - a. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in "Fire Resistance Directory."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate throughpenetration firestop systems.
- C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's representative and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. DAP Inc.
 - 2. Hilti Construction Chemicals, Inc.
 - 3. Instant Firestop Mfg. Inc.
 - 4. 3M Fire Protection Products.
 - 5. Tremco.
 - 6. United States Gypsum Company.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.3 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure throughpenetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

3.5 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestop Systems for Metallic Pipes, Conduit, or Tubing: Comply with the following:
 - 1. UL-Classified Systems: C-AJ.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.
- C. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing: Comply with the following:
 - 1. UL-Classified Systems: C-AJ.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Intumescent wrap strips.
 - e. Firestop device.
- D. Firestop Systems for Electrical Cables: Comply with the following:
 - 1. UL-Classified Systems: C-AJ.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Silicone foam.
- E. Firestop Systems for Cable Trays: Comply with the following:
 - 1. UL-Classified Systems: C-AJ.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.

- b. Intumescent putty.
- c. Silicone foam.
- d. Pillows/bags.
- F. Firestop Systems for Insulated Pipes: Comply with the following:
 - 1. UL-Classified Systems: C-AJ.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Silicone foam.
 - d. Intumescent wrap strips.
- G. Firestop Systems for Miscellaneous Electrical Penetrants: Comply with the following:
 - 1. UL-Classified Systems: C-AJ.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Mortar.
- H. Firestop Systems for Miscellaneous Mechanical Penetrations: Comply with the following:
 - 1. UL-Classified Systems: C-AJ.
 - 2. Type of Fill Materials: One or both of the following:
 - a. Latex sealant.
 - b. Mortar.
- I. Firestop Systems for Groupings of Penetrations: Comply with the following:
 - 1. UL-Classified Systems: C-AJ.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Mortar.
 - c. Intumescent wrap strips.
 - d. Firestop device.
 - e. Intumescent composite sheet.

END OF SECTION 07_8413

SECTION 07_9213 - ELASTOMERIC JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 1 Specification Sections, apply to this Section.
- B. This Section includes, but is not limited to, joint sealants for the following applications. Also see Joint Sealant Schedule, Article 3.7.
 - 1. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Perimeter joints of exterior openings where indicated.
 - b. Tile control and expansion joints.
 - c. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - d. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - e. Other joints as indicated.
 - f. STC rated joints.
 - 2. Interior joints in the following horizontal traffic surfaces:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - c. Other joints as indicated.
- C. Expansion Control Seal.

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- D. Qualification Data: For manufacturer and installer.
- E. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.
 - 1. Complete field-adhesion-test log with recorded results.

- F. Product Test Reports: Based on comprehensive testing by manufacturer of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- G. Warranties: Specimen copy of manufacturer's warranties specified in this Section for review.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer that has a joint sealant system identical to that used for this Project with a record of successful in-service performance.
- C. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
- E. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - b. Each type of nonelastomeric sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - b. Manufacturer's technical representative shall write up test results and submit a copy on manufacturer's letterhead to Owner and Architect within 10 work days.
 - 5. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section 01_3100 "Project Management and Coordination."

- 1. Meet with Installer, and installers whose work interfaces with or affects joint sealers.
- 2. Review methods and procedures related to joint sealers.
- 3. Examine substrate conditions for compliance with requirements, including joint configuration and installation tolerances.
- 4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant, Owner, and Architect.

1.5 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

- A. Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: One year from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles. Submit equal or better products for approval under provisions of Substitutions requirements Section 01_2500.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range to match as close as possible an adjacent surface.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquidapplied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Immersion in Liquids: Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Single-Component Neutral-Curing Silicone Sealant:
 - 1. Type and Grade: S (single component) and NS (nonsag).
 - 2. Class: 25.
 - 3. Use Related to Exposure: NT (nontraffic).
- F. Single-Component Acid-Curing Silicone Sealant:
 - 1. Type and Grade: S (single component) and NS (nonsag).
 - 2. Class: 25.
 - 3. Use Related to Exposure: NT (nontraffic).
- G. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:
 - 1. Type and Grade: S (single component) and NS (nonsag).
 - 2. Class: 25.
 - 3. Use Related to Exposure: NT (nontraffic).
- H. Multicomponent Pourable Urethane Sealant:
 - 1. Type and Grade: Type 1, Grade M (multicomponent) and P (pourable).
 - 2. Class: A.
 - 3. Use Related to Exposure: T (traffic).

2.4 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.

2.5 ACOUSTICAL SEALANTS

A. Latex Sealant: Nonsag, paintable, nonstaining complying with ASTM C834.

2.6 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330; any of the following types: type C (closed-cell material with a surface skin), type O (open-cell material), or type B (bicellular material with a surface skin), approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed sealant joints as follows:
 - a. Perform 2 tests on different buildings for each type of sealant and joint substrate. If results are different, repeat.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
 - 4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free of voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
 - 5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 - 6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT SEALANT SCHEDULE

JOINT SEALANT SCHEDULE	
JOINT SEALERS	DESCRIPTION OF JOINT CONSTRUCTION AND LOCATION WHERE SEALANT IS TYPICALLY APPLIED*
Multi-Part Pourable Urethane Sealant	Exterior and interior joints in horizontal surfaces of con- crete; between metal, concrete, mortar, and masonry.
One-Part Neutral Cure Silicone Sealant	Exterior and interior joints in vertical surfaces of concrete, masonry, metal, mortar; interior and exterior perimeter joints of hollow metal frames in exterior walls; and exteri- or overhead joints.
One-Part Acid-Curing Silicone Sealant	Exposed joints within glazed skylight framing systems, and aluminum entrance framing systems.
One-Part Mildew-Resistant Silicone Sealant	Interior joints of ceramic tile, plastic laminate, and metal in toilet rooms, locker rooms, utility closets, and similar wet spaces.
One-Part Latex Acrylic Sealant (Non-Sag)	Interior joints in field-painted surfaces at perimeter of hol- low metal door and window frames; in gypsum drywall, and all other interior joints not indicated otherwise.
Acoustical Sealant	Interior exposed and concealed joints in STC rated parti- tions.
 * Install sealant indicated in joints fitting descriptions and locations listed above and as indicated on Drawings. ** NOTE: All SEALANT PRODUCTS MUST BE LOW VOC. Refer to Section 01_8113 for VOC limits for specific product types. 	

END OF SECTION 07_9213

DIVISION 08 – OPENINGS

SECTION 08_1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Steel doors.
 - 2. Steel door frames.
 - 3. Fire-rated door and frame assemblies.

1.3 DEFINITIONS

A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.4 SUBMITTALS

- A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B. Shop Drawings: Show the following:
 - 1. Elevations of each door design.
 - 2. Details of doors including vertical and horizontal edge details.
 - 3. Frame details for each frame type including dimensioned profiles.
 - 4. Details and locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - a. Contractor shall verify and confirm throat openings for all interior partition types in multilayer laminated dry-wall assemblies. Confirm on shop drawings.
 - 6. Details of anchorages, accessories, joints, and connections.
 - 7. Coordination of glazing frames and stops with glass and glazing requirements.
- C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.5 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
 - 1. Test Pressure: Test at atmospheric pressure.
 - 2. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm-) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Steel Doors and Frames:
 - a. Amweld Building Products, Inc.
 - b. Ceco Door Products; a United Dominion Company.
 - c. Steelcraft; a division of Ingersoll-Rand.

2.2 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.
- C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.
- E. Grout for interior frames: Cementitious masonry non-shrink grout with a maximum slump of 4 inches.

2.3 DOORS

- A. General: Provide doors of sizes, thicknesses, and designs indicated.
- B. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless), minimum 16 gage steel.
- C. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless), minimum 18 gage galvanized steel.
- D. Vision Lite Systems: Manufacturer's standard kits consisting of glass lite moldings to accommodate glass thickness and size of vision lite indicated.

2.4 FRAMES

- A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
- B. Frame thickness shall be as follows:
 - 1. Exterior door frames shall be min. 14 gage thick.
 - 2. Interior door frames shall be 16 gage thick.
- C. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- D. Supports and Anchors: Fabricated from not less than 0.042-inch-thick, electrolytic zinc-coated or metallic-coated steel sheet.
 - 1. Wall Anchors in Masonry Construction: 0.177-inch-diameter, steel wire complying with ASTM A 510 (ASTM A 510M) may be used in place of steel sheet.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

2.5 FABRICATION

- A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.
- B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch-thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

- C. Interior Door Faces: Fabricate exposed faces of doors, including stiles and rails of nonflush units, from the following material:
 - 1. Cold-rolled steel sheet, unless otherwise indicated.
 - 2. Metallic-coated steel sheet where indicated.
- D. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.
- E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch at bottom.
- F. Clearances for Fire-Rated Doors: As required by NFPA 80.
- G. Single-Acting, Door-Edge Profile: Beveled edge.
- H. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- I. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- J. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- K. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.
 - 1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.41 Btu/sq. ft. x h x deg F or better.
- L. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
 - 1. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.
- M. Frame Construction: Fabricate frames to shape shown. All interior frames shall be slip on dry-wall type, throat openings shall be coordinated by contractor according to partition type and number of layers of dry-wall laminations, coordinate with partition types on plans.
 - 1. Fabricate frames with mitered or coped and continuously welded corners.
 - 2. Provide welded frames with temporary spreader bars.
- N. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- O. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- P. Glazing Stops: Manufacturer's standard, formed from 0.032-inch- thick steel sheet.
 - 1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.

- 2. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.
- Q. Astragals: As required by NFPA 80 to provide fire ratings indicated.

2.6 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. All interior frames shall be fully grouted around perimeter of frame
 - 1. Grout shall be cementitious masonry non-shrink grout with a maximum slump of 4 inches.
 - 2. Plaster grout will not be acceptable.
 - 3. Grout shall be stopped within 6 inches of the floor to prevent wicking. Frames shall be braced sufficiently to prevent sagging of the header or bowing of the jambs due to the weight or pressure of uncured grout.
 - 4. Grout shall be installed to a depth within the frame that still allows the required 1/2 inch overlap with drywall for all required rated openings.
 - 5. Grout shall be fully cured and dry prior to installation within gypsum wallboard assemblies.
 - 6. If antifreeze admixtures are used due to time and season schedule requirements, a waterproof bituminous or epoxy paint coating shall be provided inside the frame prior to the installation of grout.
 - 7. Bituminous coatings are not permitted on fire rated frame assemblies
- C. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - 1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.
 - 2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
 - 3. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
 - 4. Install fire-rated frames according to NFPA 80.
 - 5. For openings 90 inches or more in height, install an additional anchor at hinge and strike jambs.
- D. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.
 - 1. Fire-Rated Doors: Install within clearances specified in NFPA 80.

2. Smoke-Control Doors: Install to comply with NFPA 105.

3.2 ADJUSTING AND CLEANING

- A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.
- B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08_1113

SECTION 08_1416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Solid-core doors with wood-veneer, faces and factory finish.
- B. Related Requirements:
 - 1. Section 062023 "Interior Finish Carpentry", Section 064800 "Wood Frames" for wood door frames including fire-rated wood door frames.
 - 2. Section 088000 "Glazing" for glass view panels in flush wood doors for [factory] [field] installation.

1.3 SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction and trim for openings.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate fire ratings for fire doors.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors and jambs through one source from a single manufacturer.
- B. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated."
 - 1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252. 450 deg F

1.5 DELIVERY, STORAGE, AND HANDLING

FLUSH WOOD DOORS
- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 **PROJECT CONDITIONS**

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 17 and 50 percent during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Flush Wood Doors:
 - a. Marshfield
 - b. Graham
 - c. Mohawk
 - d. Eggers

2.2 DOOR CONSTRUCTION, GENERAL

- A. Doors for Transparent Finish:
 - 1. Grade: Custom, with Grade A faces.
 - 2. Species and Cut: Select White Birch, plain sliced.
 - 3. Match between Veneer Leaves: Book match.
 - 4. Assembly of Veneer Leaves on Door Faces: balance match.
 - 5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 - 6. Room Match: Match door faces within each separate room or area of building. Corridor door faces do not need to match where they are separated by 10 feet or more.
 - 7. Stiles: Same species as faces or a compatible species.
 - 8. Glass stop: provide species matched straight bead at all un-rated openings, provide wood wrapped metal vision frame at all fire rated openings.

2.3 SOLID-CORE DOORS

- 1. Particleboard: ANSI A208.1, Grade LD-2.
- 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch top-rail blocking, in doors indicated to have closers.

- b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
- c. 5-inch midrail blocking, in doors indicated to have exit devices.
- 3. Provide doors with either glued-block or structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.
- B. Interior Veneer-Faced Doors:
 - 1. Core: Either glued or nonglued block or structural composite lumber.
 - 2. Construction: Seven plies, either bonded or nonbonded construction.
- C. Fire-Rated Doors:
 - 1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
 - 2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch midrail blocking, in doors indicated to have armor plates.
 - d. 5-inch midrail blocking, in doors indicated to have exit devices.
 - 3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
 - 4. Pairs: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.

2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of firerated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 - 1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Factory cut and trim openings through doors.

- 1. Light Openings: Trim openings with moldings of material and profile indicated.
- 2. Glazing: Factory install glazing in fire rated and in doors indicated to be factory finished.
- Comply with applicable requirements in Section 088000 "Glazing."
- 3. Louvers: Factory install louvers in prepared openings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Unless otherwise indicated on drawings, finish wood doors at factory to receive transparent finish.
- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI conversion varnish or catalyzed polyurethane.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
 - 5. Sheen: Satin.

3.4 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

FLUSH WOOD DOORS

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08_1416

SECTION 08_2210- COMMERCIAL WOOD AND CLAD WOOD OUTSWINGING DOOR AND SIDELITES

PART 1 GENERAL

1.1 SUMMARY

- A. Related Documents: Provisions established within the General and Supplementary Conditions of the Contract, Division 1 General Requirements, and the Drawings are collectively applicable to this Section.
- B. Section Includes:
- C. (EXTERIOR) Aluminum clad wood swing panels (outswing) installed in frame
- D. (INTERIOR) Wood swing door panels (outswing) installed in frame
- E. Related Sections:
 - 1. Section 06 1000 Rough Carpentry: Wood blocking.
 - 2. Section 07 6200 Sheet Metal Flashing and Trim: Flashing for opening.
 - 3. Section 09 9100 Painting: Field finishing.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 2604 "Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels."
 - 2. AAMA 2605 "Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels."
- B. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1 "Safety Glazing Materials Used in Buildings Safety Performance Specifications and Methods of Test."
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM B 136 "Standard for Measurement of Stain Resistance of Anodic Coatings on Aluminum."
 - 2. ASTM B 137 "Standard for Measurement of Coating Mass Per Unit Area on Anodically Coated Aluminum."
 - 3. ASTM B 244 "Standard for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings or Nonmagnetic Basis Metals with Eddy Current Instruments."
 - 4. ASTM C 1036 "Standard Specification for Flat Glass."
 - 5. ASTM C 1048 "Standard Specification for Heat-Treated Flat Glass Kind HS, Kind FT Coated and Uncoated Glass."
 - 6. ASTM D 3359 "Standard Test Methods for Measuring Adhesion by Tape Test."
 - 7. ASTM D 5235 "Standard Test Method for Microscopical Measurement of Dry Film Thickness of Coatings on Wood Products."
 - 8. ASTM D 5572 "Standard Specification for Adhesives Used for Finger Joints in Nonstructural Lumber Products."
 - 9. ASTM D 5751 "Standard Specification for Laminate Joints in Nonstructural Lumber Products."
- D. National Fenestration Rating Council (NFRC):
 - 1. NFRC 100 "Procedure for Determining Fenestration Products U-Factors."
 - 2. NFRC 200 "Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence."
 - 3. NFRC 300 "Procedure for Determining Solar Optical Properties of Simple Fenestration Product."
- E. Consumer Products Safety Commission:
 - 1. 16 CFR, Part 1201 "Safety Standard for Architectural Glazing Material."

- F. Window and Door Manufacturers Association (WDMA):
 - 1. WDMA I.S.4 "Industry Standard for Water Repellant Preservative Non-Pressure Treatment for Millwork."

1.3 DEFINITIONS

- A. U Cog: Units $Btu/(hr \cdot ft^2 \cdot F)$, center-of-glass U value. Center-of-glass is the central glazed portion of the window which one sees through that is more than 2.5 inches from sightline.
- B. U/R Total: Value of total unit calculated per NFRC 100 using window and frame. U Factor is the primary measure of winter energy efficiency. A low U Factor means less heat passes through the unit due to exterior air and roomside air temperature differences. R Value = 1/U.
- C. SHGC: The solar heat gain coefficient of the total fenestration system represents the solar heat gain through the system relative to the incident solar radiation striking the exterior surface. Solar Heat Gain Ratings are determined in accordance with NFRC 200.
- D. Vtc: The visible transmittance of the total fenestration system is the transmittance across the visible portion of the solar spectrum where sensitivity to each wave length is weighted by the eye's response. Visible Transmittance Ratings are determined in accordance with NFRC 300.

1.4 THERMAL PERFORMANCE RATING

- A. Glazing Type and Finish: Cardinal 272, clear substrate, capillary tubes; (EXTERIOR) Clad Exterior
 - 1. Center of Glass U Value (U Cog), NFRC 100: 0.30
 - 2. U Tot., NFRC 100: 0.33
 - 3. Solar Heat Gain Coefficient (SHGC), NFRC 200:0.26
 - 4. Visible light transmission (Vtc), NFRC 300: 0.43
- B. Glazing Type and Finish: clear substrate, capillary tubes; (INTERIOR) Wood Exterior
 - 1. Center of Glass U Value (U Cog), NFRC 100: 0.54
 - 2. U Tot., NFRC 100: 0.44
 - 3. Solar Heat Gain Coefficient (SHGC), NFRC 200:0.47
 - 4. Visible light transmission (Vtc), NFRC 300: 0.49

1.5 SUBMITTALS

- A. Provide submittals under provisions of Division 1.
- B. Product Data: Include the following for each type of door required.
 - 1. Construction details and fabrication methods.
 - 2. Profiles and dimensions of individual components.
 - 3. Data on hardware, accessories, and finishes.
 - 4. Recommendations for maintenance and cleaning of exposed surfaces.
- C. Shop Drawings: Include information not fully detailed in manufacturer's product data and include the following for each type of door required.
 - 1. Fabrication, layout and installation details, including anchors.
 - 2. Typical door elevations. Elevations at 1/4 inch = 1 foot (1:50) scale and typical window unit elevations at 3/4 inch = 1 foot (1:20) scale.
 - 3. Full size section details of typical composite members, including reinforcement.
 - 4. Glazing details.
 - 5. Accessories.
- D. Samples: Submit color samples as appropriate.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall have produced types of doors specified for not less than ten years, with similar projects that have been in successful use for not less than ten years.
- B. Obtain aluminum clad wood door units through one source from a single manufacturer.

- C. Safety Glass Standard: Provide products complying with testing requirements of United States Consumer Product Safety Commission's 16 CFR, Part 1201 for Category II materials or as prescribed by local codes. Provide products complying with ANSI Z97.1.
 - 1. Subject to compliance with project requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- D. Insulated Glass Certification: Provide insulated glass units permanently marked on spacers or on at least one component pane of units with appropriate certification label of inspecting agency.
- E. Wood Components Sustainability Standards: Provide products that have been certified by independent third parties and labeled as having been produced in compliance with the accepted principles of sustainable forest management. Current certification systems that meet this standard of sustainability include the SFITM or Sustainable Forestry Initiative (independent third-party verification), the ISO 14001 EMS program, the FSC (Forest Stewardship Council) system, and the CSA (Canadian Standards Association) certification system.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in original packaging, undamaged, with instructions.
- B. Store off ground and protect from weather.

1.8 LIMITED WARRANTY

- A. Insulated Glass: Provide manufacturer's limited warranty against failure of air seal due to defects in materials or workmanship for period of 20 years from date of manufacture.
- B. Wood Components, Hardware, and Weatherstripping: Provide manufacturer's ten year limited warranty against defects in workmanship or materials which might unreasonably affect product's normal functioning.
 - 1. Commercial 2605 Metal Clad Warranty: Provide manufacturer's 20 year limited warranty on metal clad coating against cracking, checking, color change, chalking or peeling (adhesion loss) in normal conditions; 10 year limited warranty on metal clad coating against cracking, checking, color change, chalking or peeling (adhesion loss) in extreme conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Drawings and Specifications for product as manufactured by **Sierra Pacific Windows**, Red Bluff, California.

2.2 MATERIALS

- A. Wood: Douglas fir, kiln dried to moisture content of 6 to 12 percent at time of fabrication; waterrepellent preservative treated in accordance with WDMA I.S.4.
 - 1. Grade and Grain:
 - a. Interior Exposed Wood: Solid clear, suitable for staining or painting.
 - b. Exterior Exposed Wood: Solid Clear, suitable for staining or painting.
- B. Aluminum Cladding: Extruded 6063 T5 grade aluminum.
 - 1. Frame Cladding Thickness: 0.062 inch.
 - 2. Panel Cladding Thickness: 0.075 inch.
- C. Glazing: Provide manufacturer's standard glazing material.
 - 1. Safety Glass: ASTM C 1048, glazing select quality, Kind FT (Fully Tempered) 1/8 inch thick [minimum].
 - 2. Insulated Glass (IG): Outer pane of 1/8"; inner pane of 1/8"; 3/4 inch total thickness separated by 1/2 inch silicone foam Super Spacer® system from Quanex.
 - a. Capillary vent tube: Manufacturer's standard design.

2.3 COMPONENTS

1.

- A. Hardware: No handleset, trim set, locking hardware or closures provided with the commercial wood or clad wood out-swinging door system. Hardware to be supplied by others.
 - Hinges: 4 inches by 4 inches ball-bearing, stainless steel, non-removable pin.
 - a. Provide four hinges on doors from 87 inches to 107 inches in height
 - b. Provide two hinges on each door with non-removable pins.
- B. Sill: Extruded low profile aluminum sill (ADA compliant).
- C. Weatherstripping:
 - 1. Head and Side Jambs: Vinyl-covered foam weatherstrip.
 - 2. Panel Tops: Leaf type weatherstrip.
 - 3. Panel Bottoms: Mohair weatherstrip.
- D. Drip Cap: Clad: Extruded aluminum clad drip cap factory mounted to frame.

2.4 FABRICATION

- A. Fabricate units that are reglazable from interior without dismantling.
- B. Factory assemble unit to include frame, panels, weatherstripping, applied jamb extension, astragal weather-strip (as required), drip cap.
- C. Basic Jamb:
 - 1. Basic Jamb Width: 4-9/16 inches.
- D. Panels:
 - 1. Stile and Rail Thickness: 1-23/32 inches.
 - 2. Stile Width: 5-5/8 inches.
 - 3. Top Rail Width: 6-13/16 inches.
 - 4. Bottom Rail Width: 12 inches (ADA compliant).
 - 5. Attach solid, edge-glued rails to laminated engineered stiles with 5/8 inch by 4 inch fluted dowels. Seal with exterior glue.
 - 6. Fabricate with phenolic high density laminate moisture vapor barrier laminated to both sides of stiles.
- E. Glued and Laminated Components: Comply with ASTM D 5572 and ASTM D 5751.
- F. Cladding:
 - 1. Clad exterior wood surfaces with extruded aluminum.
 - 2. Fabricate frame cladding to meet frame weatherstripping.
 - 3. Seal clad frame corners with silicone, along with butyl pads, and secure with stainless steel screws.
 - 4. Fabricate frame extrusion with continuous integral nail flange.
 - 5. Fabricate exterior of frame with accessory groove to accept retrofit trim system or clad brickmould.
- G. Glazing:
 - 1. Fabricate door unit with single lite.
- H. Sill:
 - 1. Fabricate low profile sill to comply with ADA requirements.

2.5 FINISHES

- A. Exterior Cladding:
 - 1. a. Manufacturer's 100% fluoropolymer powder; 1.5 to 2.5 mil dry film thickness. Factory finish to comply with AAMA 2605.
 - 2. Color: Color as selected by Architect from manufacturers full range of Standard colors from the ColorStay Collection.
- B. Drip Cap: Match frame color.
- C. Sill:

- D. Exposed Aluminum: Anodized bronze tone.
- E. Interior Exposed Wood: Unfinished for field staining.
- F. Exterior Exposed Wood: unfinished for field staining.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions.
- B. Verify that field measurements are acceptable to suit door unit tolerances.
- C. Verify sill plate is level.
- D. Verify supports and anchors are correctly and securely positioned.
- E. [Verify masonry surfaces are dry and free of excess mortar, sand, and other construction debris.]
- F. [Verify wood frame walls are dry, clean, sound, well-nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches of the corner.]
- G. Scheduling of installation implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer's acceptance of substrate and conditions.

3.2 PREPARATION

A. Coordinate door installation with wall flashings and other built-in components.

3.3 INSTALLATION

- A. Install door units, hardware (as provided by others), and components in accordance with manufacturer's instructions and approved shop drawings, in compliance with specified performance requirements, and to provide weathertight construction.
- B. Anchor components rigidly and securely to building structure, plumb and level, accurately fitted, and free from distortion or defects.
- C. Fit exposed connections to form tight hairline joints.

3.4 ADJUSTING

A. Adjust doors, hardware, and weatherstripping to provide tight fit at contact points, smooth operation, and weather-tight closure.

3.5 CLEANING

- A. Clean interior and exterior surfaces immediately after installation in accordance with manufacturer's recommendations for cleaning and maintenance.
- B. Remove temporary labels from surfaces.
- C. Remove and replace glass damaged during construction period.

3.6 PROTECTION

A. Protect door units from damage or deterioration until Substantial Completion.

END OF SECTION 08_2210

SECTION 08_5550 - AWNING WOOD AND CLAD WOOD WINDOWS

PART 1 GENERAL

1.1 SUMMARY

- A. Related Documents: Provisions established within the General and Supplementary Conditions of the Contract, Division 1 General Requirements, and the Drawings are collectively applicable to this Section.
- B. Section Includes:
 - 1. Aluminum clad wood awning windows with outward opening sash (or fixed sash) installed in frame.
- C. Related Sections:
 - 1. Section 06 1000 Rough Carpentry: Wood blocking.
 - 2. Section 07 6200 Sheet Metal Flashing and Trim: Flashing for opening.
 - 3. Section 09 9100 Painting: Field finishing.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA/WDMA/CSA 101/I.S.2/A440-08 "NAFS North American Fenestration Standard/Specification for windows, doors and skylights."
 - 2. AAMA/WDMA/CSA 101/I.S.2/A440-11 "NAFS 2011 North American Fenestration Standard/Specification for windows, doors and skylights."
 - 3. AAMA 901.1 "Voluntary Specification for Rotary Operators in Window Applications."
 - 4. AAMA 2604 "Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels."
 - 5. AAMA 2605 "Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels."
- B. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1 "Safety Glazing Materials Used in Buildings Safety Performance Specifications and Methods of Test."
 - 2. ANSI/AAMA/NWWDA 101/I.S.2 "Voluntary Specification for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors."
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM B 117 "Standard Practice for Operating Salt Spray (Fog) Apparatus."
 - 2. ASTM B 136 "Standard for Measurement of Stain Resistance of Anodic Coatings on Aluminum."
 - 3. ASTM B 137 "Standard for Measurement of Coating Mass Per Unit Area on Anodically Coated Aluminum."
 - 4. ASTM B 244 "Standard for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings or Nonmagnetic Basis Metals with Eddy Current Instruments."
 - 5. ASTM C 509 "Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material."
 - 6. ASTM C 1036 "Standard Specification for Flat Glass."
 - 7. ASTM C 1048 "Standard Specification for Heat-Treated Flat Glass Kind HS, Kind FT Coated and Uncoated Glass."
 - 8. ASTM D 3359 "Standard Test Methods for Measuring Adhesion by Tape Test."
 - 9. ASTM D 4272 "Standard Test Method for Total Energy Impact of Plastic Films by Dart Drop."
 - 10. ASTM D 5235 "Standard Test Method for Microscopical Measurement of Dry Film Thickness of Coatings on Wood Products."

- 11. ASTM D 5572 "Standard Specification for Adhesives Used for Finger Joints in Nonstructural Lumber Products."
- 12. ASTM D 5751 "Standard Specification for Laminate Joints in Nonstructural Lumber Products."
- 13. ASTM E 283 "Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors."
- 14. ASTM E 330 "Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference."
- 15. ASTM E 547 "Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential."
- 16. ASTM E 1424 "Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure and Temperature Differences Across the Specimen."
- 17. ASTM F 588 "Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact."
- D. Canadian Standards Association
 - 1. AAMA/WDMA/CSA 101./I.S.2/A440-08 "NAFS North American Fenestration Standard/Specification for windows, doors and skylights."
 - 2. CSA A440S1-09 "Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS North American Fenestration Standard/Specification for windows, doors and skylights."
- E. Consumer Products Safety Commission:
 - 1. 16 CFR, Part 1201 "Safety Standard for Architectural Glazing Material."
- F. National Fenestration Rating Council (NFRC):
 - 1. NFRC 100 "Procedure for Determining Fenestration Products U-Factors."
 - 2. NFRC 200 "Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence."
 - 3. NFRC 300 "Procedure for Determining Solar Optical Properties of Simple Fenestration Product."
- G. Window and Door Manufacturers Association (WDMA):
 - 1. AAMA/WDMA/CSA 101/I.S.2/A440-08 "NAFS North American Fenestration Standard/Specification for windows, doors and skylights."
 - 2. AAMA/WDMA/CSA 101/I.S.2/A440-11 "NAFS 2011 North American Fenestration Standard/Specification for windows, doors and skylights."
 - 3. WDMA I.S.4 "Industry Standard for Water Repellant Preservative Non-Pressure Treatment for Millwork."

1.3 DEFINITIONS

- A. U Cog: Units $Btu/(hr \cdot ft^2 \cdot F)$, center-of-glass U value. Center-of-glass is the central glazed portion of the window which one sees through that is more than 2.5 inches from sightline.
- B. U/R Total: Value of total unit calculated per NFRC 100 using window and frame. U Factor is the primary measure of winter energy efficiency. A low U Factor means less heat passes through the unit due to exterior air and room-side air temperature differences. R Value = 1/U.
- C. SHGC: The solar heat gain coefficient of the total fenestration system represents the solar heat gain through the system relative to the incident solar radiation striking the exterior surface. Solar Heat Gain Ratings are determined in accordance with NFRC 200.
- D. Vtc: The visible transmittance of the total fenestration system is the transmittance across the visible portion of the solar spectrum where sensitivity to each wave length is weighted by the eye's response. Visible Transmittance Ratings are determined in accordance with NFRC 300.

1.4 PERFORMANCE REQUIREMENTS

A. Class CW-PG30, AAMA/WDMA/CSA 101/I.S.2/A440-08:
 1. Air Infiltration, ASTM E 283: Maximum 0.3 cfm/ft² at 1.57 psf. (25 mph).

- 2. Water Resistance, ASTM E 547: No leakage at 4.50 psf. (41.93 mph).
- 3. Structural Performance, ASTM E 330: Withstands up to +/-30 psf. (108.25 mph).

1.5 THERMAL PERFORMANCE RATING

- A. Glazing Type and Finish: Cardinal 272, clear substrate, capillary tubes
 - 1. Center of Glass U Value (U Cog), NFRC 100: 0.30
 - 2. U Tot., NFRC 100: 0.32
 - 3. Solar Heat Gain Coefficient (SHGC), NFRC 200:0.29
 - 4. Visible light transmission (Vtc), NFRC 300: 0.48

1.6 SUBMITTALS

- A. Provide submittals under provisions of Division 1.
- B. Product Data: Include the following for each type of window required.
 - 1. Construction details and fabrication methods.
 - 2. Profiles and dimensions of individual components.
 - 3. Data on hardware, accessories, and finishes.
 - 4. Recommendations for maintenance and cleaning of exposed surfaces.
- C. Shop Drawings: Include information not fully detailed in manufacturer's product data and include the following for each type of window required.
 - 1. Layout and installation details, including anchors.
 - 2. Elevations at 1/4 inch = 1 foot (1:50) scale and typical window unit elevations at 3/4 inch = 1 foot (1:20) scale.
 - 3. Full size section details of typical composite members, including reinforcement and stiffeners.
 - 4. Hardware, including operators.
 - 5. Glazing details.
 - 6. Accessories.
- D. Samples: Submit color samples as appropriate.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall have produced types of windows specified for not less than ten years, with similar projects that have been in successful use for not less than ten years.
- B. Obtain wood window units through one source from a single manufacturer.
- C. Safety Glass Standard: Provide products complying with testing requirements of United States Consumer Product Safety Commission's 16 CFR, Part 1201 for Category II materials or as prescribed by local codes. Provide products complying with ANSI Z97.1.
 - 1. Subject to compliance with project requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- D. Insulated Glass Certification: Provide insulated glass units permanently marked on spacers or on at least one component pane of units with appropriate certification label of inspecting agency.
- E. WDMA Hallmark Certification: Provide products that have been certified as having been manufactured in accordance with WDMA Hallmark standards. Compliance is verified through independent third party product testing and semi-annual inspections of the manufacturing facility.
- F. Wood Components Sustainability Standards: Provide products that have been certified by independent third parties and labeled as having been produced in compliance with the accepted principles of sustainable forest management. Current certification systems that meet this standard of sustainability include the SFI™ or Sustainable Forestry Initiative (independent third-party verification), the ISO 14001 EMS program, the FSC (Forest Stewardship Council) system, and the CSA (Canadian Standards Association) certification system.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Ship units with both temporary and permanent NFRC labeling.
 - 1. Temporary label shall indicate that the unit is NFRC certified and include brief product description and thermal or energy performance values.
 - 2. Permanent label shall include manufacturer identification and performance tracking for life of product.
- B. Deliver in original packaging, undamaged, with instructions.
- C. Store off ground and protect from weather.

1.9 WARRANTY

- A. Insulated Glass: Provide manufacturer's limited warranty against failure of air seal due to defects in materials or workmanship for period of 20 years from date of manufacture.
- B. Wood Components, Hardware, Weatherstripping, [Screens]: Provide manufacturer's 10 year limited warranty against defects in workmanship or materials which might unreasonably affect product's normal functioning.
- C. Metal Clad Warranty:
 - 1. Commercial 2605 Metal Clad Warranty: Provide manufacturer's 20 year limited warranty on metal clad coating against cracking, checking, color change, chalking or peeling (adhesion loss) in normal conditions; 10 year limited warranty on metal clad coating against cracking, checking, color change, chalking or peeling (adhesion loss) in extreme conditions.

PART 2PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Drawings and Specifications for product as manufactured by **Sierra Pacific Windows**, Red Bluff, California.

2.2 MATERIALS

- A. Wood:
 - 1. Species: Douglas Fir, kiln dried to moisture content of 6 to 12 percent at time of fabrication; water-repellent preservative treated in accordance with WDMA I.S.4.
 - a. Interior Exposed Wood: Solid clear, suitable for staining or painting.
- B. Aluminum Cladding: 0.062 inch thick extruded 6063 T5 grade aluminum.
- C. Glazing: Provide manufacturer's standard glazing material.
 - 1. Float Glass: ASTM C 1036, glazing select quality, 1/8 inch thick [minimum].
 - 2. Safety Glass: ASTM C 1048, glazing select quality, Kind FT (Fully Tempered).
 - 3. of 1 8"; 3/4 inch total thickness separated by 1/2 inch silicone foam Super Spacer® system from Quanex.

a. Capillary vent tube: Manufacturer's standard design.

2.3 COMPONENTS

- A. Hardware:
 - 1. Hinge Arms: Manufacturer's standard design for use with track.
 - 2. Hinge Arm Stud: Stainless steel base with brass post, cam system to allow field adjustment.
 - 3. Track: Stainless steel track with patented camlock system allowing field adjustment to sash.
 - 4. Sash Lock: High pressure die-cast zinc housing with coppertone, [white, bronze. chestnut bronze or blackfinish.
 - a. Concealed Snubbers: Window manufacturer's standard type.

- 5. Roto Operator: High pressure zinc die-cast base with hardened steel drive worm, gears and arms; tested in accordance with AAMA 901.1, ASTM B 117, and ASTM G 87.
- B. Weatherstripping:
 - 1. Frame Weatherstrip: Closed cell foam encapsulated in seamless elastomeric skin; tested in accordance with ASTM C 509, ASTM D 4272, ASTM E 1424, and AAMA 702.
 - 2. Sash Weatherstrip: Rigid base of 5 percent glass-filled polypropylene with a slip coated thermal plastic elastomer seal.
- C. Drip Cap: Extruded aluminum clad drip cap factory mounted to frame.
- D. Screens: Aluminum framed, 18 x 16 fiberglass mesh cloth.

2.4 FABRICATION

- A. Fabricate units that are reglazable from interior without dismantling.
- B. Frame detail: Contemporary.
- C. Fabricate units with factory applied flashing paper.
- D. Basic Jamb: Fabricate with interior kerf for recessed bull nosed window applications.
 1. Basic Jamb Width: 4-9/16 inches.
- E. Sash: Fabricate sash corners with mortise and tenon joints, sealed and screwed.
- F. Glued and Laminated Components: Comply with ASTM D 5572 and ASTM D 5751.
- G. Cladding:
 - 1. Clad exterior wood surfaces with extruded aluminum.
 - 2. Fabricate frame cladding to meet frame weatherstripping.
 - 3. Seal clad frame corners with nylon corner keys and silicone, along with butyl pads, and secure with stainless steel screws.
 - 4. Fabricate frame extrusion with continuous integral nail flange and with interior wall for increased stability.
 - 5. Fabricate exterior of frame with accessory groove to accept retrofit trim system or clad brickmould and sill nosing.
- H. Glazing:
 - 1. Fabricate window unit with single lite.
- I. Hardware:
 - 1. Fabricate window units to 48 inches in height with one lock per side jamb; units over 48 inches in height with two per side jamb.
 - 2. Operator: Apply operator designed to be unlatched from sash to facilitate cleaning or removal of sash.
 - 3. Apply concealed snubbers at top of sash.
- J. Weatherstripping: Dual weatherstrip entire perimeter of window unit.
- K. Screens: Fabricate as spring loaded units for secure installation and with pull tabs for easy removal.

2.5 FINISHES

A.

Interior Exposed Wood: Unfinished for field staining.

- Cladding:
 - 1.
 - a. Manufacturer's 100% fluoropolymer powder; 1.5 to 2.5 mil dry film thickness.
 - Factory finish to comply with AAMA 2605.
 - 2. Color: Color as selected by Architect from manufacturers full range of Standard colors from the ColorStay collection.
- B. Drip Cap: Match frame color.
- C. Exposed Hardware:
 - 1. Coat with Truth E-Gard® Coating System.
 - 2. Color: Coppertone, White, Bronze, Chestnut Bronze or Black.
- D. [Screens:

- 1. Frame: Coppertone, White, Bronze, Chestnut Bronze or Black.
- 2. Mesh: Charcoal

PART 3 EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions.
- B. Verify that field measurements are acceptable to suit window unit tolerances.
- C. Verify sill plate is level.
- D. Verify supports and anchors are correctly and securely positioned.
- E. Verify masonry surfaces are dry and free of construction debris.
- F. Verify wood frame walls are dry, clean, sound, well-nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches of corner.
- G. Scheduling of installation implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer's acceptance of substrate and conditions.

3.2 PREPARATION

A. Coordinate window installation with wall flashings and other built-in components.

3.3 INSTALLATION

- A. Install window units, hardware, and components in accordance with manufacturer's instructions and approved shop drawings, in compliance with specified performance requirements, and to provide weather-tight construction.
- B. Anchor components rigidly and securely to building structure, plumb and level, accurately fitted, and free from distortion or defects.
- C. Fit exposed connections to form tight hairline joints.

3.4 ADJUSTING

A. Adjust operating sash, hardware, and weatherstripping to provide tight fit at contact points, smooth operation, and weather-tight closure.

3.5 CLEANING

- A. Clean interior and exterior surfaces immediately after installation in accordance with manufacturer's recommendations for cleaning and maintenance.
- B. Remove temporary labels from surfaces.
- C. Remove and replace glass damaged during construction period.

3.6 PROTECTION

A. Protect window units from damage or deterioration until Substantial Completion.

END OF SECTION 08_5550

SECTION 08 7100 – DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. SECTION INCLUDES
 - 1. Finish hardware for doors.
 - 2. Electronic hardware.
 - 3. Thresholds & weatherstripping
 - 4. Keying System
 - 5. Templates
 - 6. Hardware schedule

1.2 RELATED SECTIONS

- 1. 08 11 00 Hollow metal doors and frames.
- 2. 08 14 00 Wood doors.
- 3. 08 41 00 Entrances and Storefronts.

1.3 REFERENCES

- A. Publications of agencies and organizations listed below form a part of this specification section to the extent referenced.
 - 1. DHI Recommended Locations for Builders' Hardware.
 - 2. NFPA 80 Standards for Fire Doors and Windows.
 - 3. NFPA 101 Code for Safety to Life from Fire in Buildings and Structures.
 - 4. UL Building Material Directory.
 - 5. DHI Door and Hardware Institute
 - 6. WHI Warnock Hersey
 - 7. BHMA Builders Hardware Manufacturers Association
 - 8. ANSI American National Standards Institute
 - 9. IBC International Building Code Edition as adopted and amended by local building code authorities

1.4 SUBMITTALS

- A. Schedules: Submit detailed finish hardware schedule and product data in accordance with section 01 35 00.
 - 1. 1. Furnish a typewritten schedule in vertical format complete with catalog cuts. Schedule shall be complete, including type, manufacturers name and number, and finish of each item required. Include complete schedule of keying system.
- B. Samples: If requested, submit sample of each type of finish hardware proposed for the project. If approved, samples may be used on project.
- C. Templates: Furnish templates required for fabrication of hollow metal doors and frames, aluminum and glass doors, or other items related to hardware

1.5 QUALITY ASSURANCE

- A. Supplier: Hardware supplier shall have a minimum of three years experience in supplying hardware for projects of this size and scope and shall have in his employ a certified Architectural Hardware Consultant (AHC) to prepare submittals and coordinate proper preparation for and installation of hardware.
- B. Substitutions: Manufacturers and model numbers listed are to establish a standard of quality. Similar items of approved manufacturers that are equal in design, function and quality will be accepted upon prior approval by the architect, and provided required data and physical samples are submitted in accordance with Section 01 25 00.
- C. Regulatory requirements: Conform to code requirements applicable to fire rated doors and frames and to accessibility for the physically handicapped.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Package each item of hardware in original containers and mark each to correspond with heading numbers on the hardware schedule.
- B. Include necessary instructions, templates, drawings and fasteners for proper installation.
- C. Store off the floor in a clean dry area out of the way of work in progress

1.7 WARRANTY

- A. Provide warranty of hardware items for one year.
 - 1. Provide a twenty five year warranty for door Closers.
 - 2. Provide a ten year warranty for door Lever locks.
 - 3. Provide a ten year warranty for door Exit devices.

PART 2 - PRODUCTS

MANUFACTURERS

A. Catalog numbers of manufacturers listed in the first column have been used to establish the quality required. Manufacturers listed in the other columns are acceptable.

Hinges	Ives	Bommer, Hager
Locks	Schlage	Sargent
Closers	LCN	Sargent
Flat goods	Ives	Trimco
OH Stops	Glynn Johnson	ABH
Thresholds.	Zero	National Guard, Reese
Weatherstrip	Zero	National Guard, Reese

2.02 MATERIALS

A. Screws and Fasteners: Furnish all exposed fasteners to match item being secured. Make all fasteners of the same material as item being fastened except provide stainless steel or brass for securing aluminum items.

DOOR HARDWARE

B. Hinges:

- 1. Full mortise template hinges, ball bearing type.
- 2. Non-removable pin and heavy weight at exterior doors.
- 3. Furnish quantity of hinges as follows:
 - a. Doors to 60" high: 2 hinges
 - b. Doors over 60" to 90" high: 3 hinges
 - c. Doors over 90" to 120": 4 hinges
- 4. Furnish hinge sizes as follows:
 - a. For 1 3/4" doors to 3'0" wide: 4.5" x 4.5"
 - b. For 1 3/4" doors over 3'0" wide: 5 x 4.5"
 - c. Width of hinges adjusted to clear adjacent trim.
- C. Locksets and Latchsets
 - 1. Bored type locksets complying with ANSI 156.2 Series 4000 Grade 1.
 - 2. Provide 2 3/4" backsets unless job conditions dictate otherwise.
 - 3. Provide strikes with extended lip where required to protect trim from damage by latchbolt.
 - 4. Falcon Quantum levers specified as the standard of quality.
- D. Door Closers

1. Bodies to be close grained malleable iron or aluminum with three separate control valves, including backcheck, ANSI Grade 1.

- 2. Closers to match adjacent hardware.
- 3. Provide all closers with thru bolts.
- 4. All closers to comply with Americans with Disabilities Act requirements.
- 5. LCN 4050 (Exterior),1450 FC (Interior) Series specified as the standard of quality.

E. Kick Plates

Provide .050 x 10" high x 2" less than door width for single doors and 1" less than door width for pairs.
 Ives 8400 series specified as the standard of quality.

F. Push Plates

- 1. Provide .050 x 4" x 16" push plates unless conditions dictate otherwise.
- 2. Ives 8200 series specified as the standard of quality.

G. Pull Plates

- 1. Provide .050 x 4" x 16" plate with 10" c/c pull.
- 2, Ives 8305 series specified as the standard of quality.

H. Flush Bolts

- 1. Manual flush bolts equal to Ives FB458 with 12" rods.
- 2. Provide extension rods where conditions dictate.
- I. Door Stops
 - Wall stops shall be used whenever possible. Use dome type floor stops where wall stops cannot be used.
 Ives WS401/402 specified as the standard of quality.

J. Silencers

1. Provide 3 for each single door and 2 for each pair of doors. Not required on door having weatherstripping or gasketting.

K. Thresholds and Weatherstripping as listed in hardware sets.

2.03 FINISHES

- A. Provide matching finishes for hardware items at each door opening to the greatest extent possible, except as otherwise indicated.
- B. Provide finishes which comply with those established by BHMA listed in "Materials and Finishes Standard 1301".

C. Finishes for this project are **Dull Chrome** as follows:

- 1.
 Hinges
 652

 2.
 Locksets
 626

 3.
 Flat Goods
 630
- 4. Stops 630
- 5. Closers 689

2.04 KEYING

- A. Key all locks into new master key system in accordance with owners instructions.
 - 1. Provide 3ea keys per lock cylinder.
 - 2. Provide 3ea master keys.
 - 3. Provide 3ea master control keys.
 - 4. Provide 10ea construction keys.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine doors, frames and related items for conditions that would prevent proper application of finish hardware. Do not proceed until defects have been corrected.

3.02 INSTALLATION

A. Install each item in accordance with manufacturer's instructions and recommendations. Set units level, plumb and true to line and location. Do not install surface mounted items until finishes have been completed on substrate.

3.03 ADJUST AND CLEAN

A. At final completion hardware shall be left clean and free from disfigurement. Make a final adjustment to closers and other items of hardware. Where hardware is found defective repair or replace or otherwise correct as required.

3.04 HARDWARE SETS

A. A. While the following hardware sets are intended to cover all doors and establish a type and standard of quality, it is the responsibility of the hardware supplier to examine the plans and specifications and furnish proper hardware for all openings. The hardware supplier shall review the entire specification versus the door schedule and notify the architect of any errors, inconsistencies, or omissions during the bid period.

HARDWARE SET: 01

DOOR NUMBER:

116-1 99-1

EACH TO HAVE:

1 EA	PANIC HARDWARE	99-NL-OP-110MD	626	VON
1 EA	RIM CYLINDER	20-057 ICX	626	SCH
1 EA	PERMANENT CORE	23-030	626	SCH
1 EA	LONG DOOR PULL	9266F 36"	630	IVE
1 EA	SURFACE CLOSER	4050 EDA	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	FLOOR STOP	FS410	626	IVE
		BALANCE OF HARDWARE BY DOOR		
		MANUFACTURER		

HARDWARE SET: 02

DOOR NUMBER:

116-2	99-2

EACH TO HAVE:

1 EA	PUSH PLATE	8200 4" X 16"	630	IVE
1 EA	LONG DOOR PULL	9266F 36"	630	IVE
1 EA	SURFACE CLOSER	4050 EDA	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	WALL STOP	WS406/407CVX	630	IVE
		BALANCE OF HARDWARE BY DOOR		
		MANUFACTURER		

HARDWARE SET: 03

DOOR NUMBER: 100-1

EACH TO HAVE:

2 EA	SPRING HINGE	3SP1 4.5 X 4.5	652	IVE
1 EA	PASSAGE SET	ND10S SPA	626	SCH
1 EA	WALL STOP	WS406/407CVX	630	IVE
3 EA	SILENCER	SR66	GRY	IVE

HARDWARE SET: 04

DOOR N 102-1 214-1	UMBER: 103-1 215-1	202-1	203-1	212-1	213-1	
EACH TO	D HAVE:					
3 EA	HINGE	5BB1 4	.5 X 4.5		652	IVE
1 EA	ENTRANCE LOCK	ND53T	D SPA		626	SCH
1 EA	PERMANENT CORE	23-030			626	SCH
1 EA	WALL STOP	WS406	/407CCV		630	IVE
3 EA	SILENCER	SR64			GRY	IVE

HARDWARE SET: 05

DOOR NUMBER:

104-1	109-1	204-1	205-1		
EACH TO	O HAVE:				
1 EA	BARN DOOR SET	OST150	SINGLE DOOR - LENGTH AS		BRI
		REQ'	D		
1 EA	LONG DOOR PULL	PR 9266	5 36" 20" N	630	IVE

HARDWARE SET: 06

DOOR NUMBER: 106-1

EACH TO HAVE:

	3 EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
	1 EA	DBL CYL STORE LOCK	ND66TD SPA	626	SCH
	2 EA	PERMANENT CORE	23-030	626	SCH
	1 EA	SURFACE CLOSER	4050 EDA	689	LCN
	1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
	1 EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	SEALS	188S X D.S.	BLK	ZER

HARDWARE SET: 07

DOOR NUMBER: 106-2

EACH TO HAVE:

3 EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1 EA	CLASSROOM LOCK	ND70TD SPA	626	SCH
1 EA	PERMANENT CORE	23-030	626	SCH
1 EA	WALL STOP	WS406/407CVX	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 08

DOOR NUMBER:		
108-1	115-1	207-1

EACH TO HAVE:

3 EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1 EA	PRIVACY LOCK	ND40S SPA	626	SCH
1 EA	SURFACE CLOSER	4050 PA	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	WALL STOP	WS406/407CVX	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 09

DOOR NUMBER:

110-1

EACH TO HAVE:

3 EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1 EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1 EA	PERMANENT CORE	23-030	626	SCH
1 EA	SURFACE CLOSER	4050 CUSH	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 10

DOOR NUMBER:

111-1

EACH TO HAVE:

3 EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1 EA	CLASSROOM LOCK	ND70TD SPA	626	SCH
1 EA	PERMANENT CORE	23-030	626	SCH
1 EA	SURFACE CLOSER	4050 REG	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	FIRE/LIFE WALL MAG	SEM7850	689	LCN
1 SET	SEALS	188S X D.S.	BLK	ZER

HARDWARE SET: 11

DOOR NUMBER: 112-1 113-1 114-1

EACH TO HAVE:

HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
STOREROOM LOCK	ND80TD SPA	626	SCH
PERMANENT CORE	23-030	626	SCH
OH STOP	90S	630	GLY
SILENCER	SR64	GRY	IVE
	HINGE STOREROOM LOCK PERMANENT CORE OH STOP SILENCER	HINGE5BB1 4.5 X 4.5 NRPSTOREROOM LOCKND80TD SPAPERMANENT CORE23-030OH STOP90SSILENCERSR64	HINGE 5BB1 4.5 X 4.5 NRP 652 STOREROOM LOCK ND80TD SPA 626 PERMANENT CORE 23-030 626 OH STOP 90S 630 SILENCER SR64 GRY

HARDWARE SET: 12

DOOR NUMBER: 118-1

EACH TO HAVE:

1 EA	PANIC HARDWARE	99-NL-OP-110MD	626	VON
1 EA	RIM CYLINDER	20-057 ICX	626	SCH
1 EA	PERMANENT CORE	23-030	626	SCH
1 EA	LONG DOOR PULL	9266F 36"	630	IVE
1 EA	SURFACE CLOSER	4050 SCUSH	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
		BALANCE OF HARDWARE BY DOOR		
		MANUFACTURER		

HARDWARE SET: 13

DOOR NUMBER: 206-1

EACH TO HAVE:

1 EA	SINGLE RUN	SR80 BI-PARTING 100-A20 SR80-1PK -		BRI
		LENGTH AS REQ'D		
1 EA	SINGLE RUN	SR80 SINGLE DOOR 100-A20 SR80-1PK -		BRI
		LENGTH AS REQ'D		
6 EA	FLUSH PULL	919	626	IVE

3 DOOR BI PARTING

HARDWARE SET: 14

DOOR NUMBER: 208-1

EACH TO HAVE:

3 EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1 EA	PANIC HARDWARE	99-L-17	626	VON
1 EA	RIM CYLINDER	20-057 ICX	626	SCH
1 EA	PERMANENT CORE	23-030	626	SCH

1 EA	SURFACE CLOSER	4050 SCUSH	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	RAIN DRIP	142A X D.W. +4" AS REQ'D	628	ZER
1 SET	SEALS	8303AA X D.S.	628	ZER
1 EA	DOOR SWEEP	39A X D.W.	719	ZER
1 EA	THRESHOLD	8655A X D.W.	719	ZER

HOLD OPEN CLOSER

HARDWARE SET: 15

DOOR NUMBER: 209-1

EACH TO HAVE:

HINGE	5BB1 4.5 X 4.5	652	IVE
STOREROOM LOCK	ND80TD SPA	626	SCH
PERMANENT CORE	23-030	626	SCH
SURFACE CLOSER	4050 REG	689	LCN
KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
WALL STOP	WS406/407CVX	630	IVE
SILENCER	SR64	GRY	IVE
	HINGE STOREROOM LOCK PERMANENT CORE SURFACE CLOSER KICK PLATE WALL STOP SILENCER	HINGE5BB1 4.5 X 4.5STOREROOM LOCKND80TD SPAPERMANENT CORE23-030SURFACE CLOSER4050 REGKICK PLATE8400 10" X 2" LDW B-CSWALL STOPWS406/407CVXSILENCERSR64	HINGE 5BB1 4.5 X 4.5 652 STOREROOM LOCK ND80TD SPA 626 PERMANENT CORE 23-030 626 SURFACE CLOSER 4050 REG 689 KICK PLATE 8400 10" X 2" LDW B-CS 630 WALL STOP WS406/407CVX 630 SILENCER SR64 GRY

HARDWARE SET: 16

DOOR NUMBER:

210-1 211-1

EACH TO HAVE:

3 EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1 EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1 EA	PERMANENT CORE	23-030	626	SCH
1 EA	WALL STOP	WS406/407CVX	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 17

DOOR NUMBER: 216.1

216-1

EACH TO HAVE:

3 EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1 EA	CLASSROOM LOCK	ND70TD SPA	626	SCH
1 EA	PERMANENT CORE	23-030	626	SCH
1 EA	WALL STOP	WS406/407CVX	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

END OF SECTION 08_7100

SECTION 08_8000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes glazing and spandrel panels for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Fixed aluminum storefront windows.
 - 2. Lites of hollow metal & solid wood doors.
 - 3. Glazed storefront framing.
 - 4. Glazed curtain wall.
 - 5. Glazed interior aluminum office front framing & doors.
 - 6. Metal framed skylights

1.3 DEFINITIONS

- A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- C. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for 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.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

- a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
- b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action. Load duration shall be 60 seconds.
- c. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
- d. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 - 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 - 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - a. Properties based on Viracon Solarscreen Low-E product number VE 1-2M
 - 3. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
 - 1) Summer 0.26
 - 2) Winter 0.29
 - b. Solar Heat Gain Coefficient: Reference NFRC 200.
 1) 0.38 min
 - Shading Coefficient
 - 1) 0.44 min

1.5 SUBMITTALS

c.

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: 12-inch- square, for each type of glass product indicated, other than monolithic clear float glass.
- C. Glazing Schedule: Use same designations indicated on Drawings.

1.6 QUALITY ASSURANCE

- A. Glazing for Fire-Rated Door and Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- B. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201and, for wired glass, ANSI Z97.1.

- C. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- D. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- E. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulatingglass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.9 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
 - 2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 - 3. For uncoated glass, comply with requirements for Condition A.
 - 4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 - 5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- C. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
 - 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 - 2. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 - a. All insulating units with standard air gas
 - b. All insulating units shall be 1 inch thick unless noted otherwise
 - 3. Sealing System: Dual seal.
 - 4. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Spacer Material: Aluminum with mill or clear anodic finish.
 - b. Corner Construction: Manufacturer's standard corner construction.
- D. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Opalika white flashed opal glass, as manufactured by Schott North America, Inc., <u>www.us.schott.com</u> or comparable product by one of the following:
 - a. Optifloat Opal as manufactured by Pilkington North America Inc., <u>www.pilkington.com</u>
- 2. Glass: Clear float.
- 3. Ceramic Coating Color: As selected by Architect from manufacturer's full range
- 4. Locations: At select curtainwall & interior office front glazing as identified by "Spandrel Glass" designation on sheet A-603 "Curtainwall Schedule", & "Obscure Glazing" sheet A-604 "Officefront Schedule".

2.3 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 - 1. Neoprene, ASTM C 864.
 - 2. EPDM, ASTM C 864.
 - 3. Silicone, ASTM C 1115.
 - 4. Thermoplastic polyolefin rubber, ASTM C 1115.
 - 5. Any material indicated above.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
 - 1. Neoprene.
 - 2. EPDM.
 - 3. Silicone.
 - 4. Thermoplastic polyolefin rubber.
 - 5. Any material indicated above.

2.4 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
 - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Single-Component Neutral- and Basic-Curing Silicone Glazing Sealants:

- a. Type and Grade: S (single component) and NS (nonsag).
- b. Class: 100/50.
- c. Use Related to Exposure: NT (nontraffic).
- d. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

2.5 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
 - 1. Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

- 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: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.8 MONOLITHIC FLOAT-GLASS UNITS

- A. Uncoated Clear Float-Glass (GL-1): Class 1 (clear) annealed. Provide Kind FT (fully tempered) float glass where indicated on drawings.
 - 1. Thickness: 6.0 mm.
- B. Coated Float-Glass (GL-2): Class 1 (clear) Kind FT (fully tempered) units"
 - 1. Available Products: Viracon Solarscreen Low-E type VE-2M and shall meet the following minimum performance criteria or better:
 - a. U-Value Winter = 0.29
 - b. U-Value Summer = 0.26
 - c. Shade Coefficient SC = 0.44
 - d. Solar Heat Gain Coefficient SHGC = .38
 - e. Light to Solar Gain LSG = 1.85

2.9 FABRICATION OF INSULATED GLAZING UNITS

- A. Coated Float-Glass clear fully tempered units
 - 1. Outer light, ¹/₄" clear: based on Viracon Solarscreen Low-E type VE-2M on #2 surface, shall meet the following minimum performance criteria or better:
 - a. U-Value Winter = 0.29
 - b. U-Value Summer = 0.26
 - c. Shade Coefficient SC = 0.44
 - d. Solar Heat Gain Coefficient SHGC = .38
 - e. Light to Solar Gain LSG = 1.85
 - 2. $\frac{1}{2}$ " airspace
 - 3. Inner light, $\frac{1}{4}$ clear.

2.10 FABRICATION OF INSULATED SPANDREL GLASS UNITS

- A. Coated Float-Glass clear fully tempered Spandrel Glass units
 - 1. Outer light, ¹/₄" clear: based on Viracon Solarscreen Low-E type VE-2M on #2 surface, shall meet the following minimum performance criteria or better:
 - a. U-Value Winter = 0.29
 - b. U-Value Summer = 0.26
 - c. Shade Coefficient SC = 0.44
 - d. Solar Heat Gain Coefficient SHGC = .38
 - e. Light to Solar Gain LSG = 1.85
 - 2. $\frac{1}{2}$ " airspace
 - 3. Inner light, ¼" clear, with ceramic coating on 4th surface (inside face). Ceramic coating shall be as specified in "Ceramic Coated Spandrel Glass" paragraph 2.2D above.
 - 4. Locations: select curtainwall glazing as identified by "Spandrel Glass" in Curtainwall Schedule, sheet A-603 of drawings.

PART 3 - EXECUTION

3.1 GLAZING

- A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
 - 1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
 - 2. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
 - 3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
 - 4. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
 - 5. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
 - 6. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 7. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- B. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
 - 1. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
 - 2. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
 - 3. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
 - 1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
 - 2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 - 3. Install gaskets so they protrude past face of glazing stops.
- D. Sealant Glazing (Wet): Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers

and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

- 1. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- 2. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.2 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- C. Insulated spandrel panels shall be clean and free from fabrication marks, dings, dents, or scratches/knife score lines. Panels with blemishes shall be replaced.

END OF SECTION 08_8000

SECTION 08_8300 - MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:
 - 1. Annealed monolithic glass mirrors.
 - 2. Film-backed glass mirrors qualifying as safety glazing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
- C. Samples:
 - 1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
 - 2. Mirror Clips: Full size.
 - 3. Mirror Trim: 12 inches long.

1.3 INFORMATIONAL SUBMITTALS

- A. Preconstruction test reports.
- B. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Glazing Publications: Comply with GANA's "Glazing Manual" and "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- B. Safety Glazing Products: For film-backed mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.
- C. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing and substrates on which mirrors are installed.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

- A. Glass Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, provide products by one of the following, but are not limited to, the following:
 - a. <u>Arch Aluminum & Glass Co., Inc</u>.
 - b. <u>Avalon Glass and Mirror Company</u>.
 - c. Binswanger Mirror; a division of Vitro America, Inc.
 - d. <u>D & W Incorporated</u>
 - e. <u>Donisi Mirror Company</u>.
 - f. <u>Gardner Glass, Inc</u>.
 - g. <u>Gilded Mirrors, Inc</u>.
 - h. <u>Guardian Industries</u>.
 - i. <u>Head West</u>.
 - j. <u>Independent Mirror Industries, Inc</u>.
 - k. Lenoir Mirror Company.
 - 1. <u>Maran-Wurzell Glass & Mirror</u>.
 - m. <u>National Glass Industries</u>.
 - n. <u>Stroupe Mirror Co., Inc</u>.
 - o. <u>Sunshine Mirror; Westshore Glass Corp</u>.
 - p. <u>Virginia Mirror Company, Inc</u>.
 - q. <u>Walker Glass Co., Ltd</u>.
- B. Clear Glass: Mirror Select.
 - 1. Nominal Thickness: 3.0 mm.
- C. Tempered Clear Glass: Mirror Glazing Quality, for blemish requirements; and comply with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.
 - 1. Nominal Thickness: 3.0 mm.
- D. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- E. Edge Sealer: Approved by mirror manufacturer.
- F. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors.

- 1. Adhesive shall have a VOC content of not more than **70** g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- G. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.2 MIRROR HARDWARE

- A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
 - 1. Finish: Clear bright anodized.
- B. Mirror Bottom Clips: As indicated.
- C. Mirror Top Clips: As indicated.
- D. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- E. Anchors and Inserts: Provide devices as required for mirror hardware installation.

2.3 FABRICATION

- A. Cutouts: Fabricate cutouts before tempering for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- B. Mirror Edge Treatment: Flat polished. Seal edges of mirrors with edge sealer.
- C. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
 - 1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.
- B. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.
- C. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- D. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
- E. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- F. Do not permit edges of mirrors to be exposed to standing water.
- G. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
- H. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08_8300

DIVISION 09 – FINISHES

SECTION 09_2423 - PORTLAND CEMENT PLASTER/STUCCO

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Portland Cement Plaster Finishes: Stucco Acrylic based (finish coat), over metal lath.
 - 2. Metal lath and metal accessories.
 - 3. Building moisture membranes.
- B. See Division 5 Section "Cold-Formed Metal Framing" for load-bearing steel framing.
- C. See Division 9 Section "Gypsum Board Assemblies" for non-load bearing steel framing and exterior wall sheathing.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: For each exposed finish and for each color and texture required.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Where indicated, provide assemblies identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Mockups: Install mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Install mockups as directed by Architect.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 **PROJECT CONDITIONS**

A. Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.

PART 2 - PRODUCTS

2.1 LATH

- A. Expanded-Metal Lath: ASTM C 847.
 - 1. Material: Zinc-coated (galvanized) steel sheet, structural quality, with coating complying with ASTM A 653/A 653M, G60 coating designation.
 - 2. Diamond-Mesh Lath: Self-furring.
 - a. Weight: 2.5 lb/sq. yd..
- B. Woven-Wire Lath: ASTM C 1032, fabricated into 1-1/2-inch hexagonal-shaped mesh with minimum 0.0510-inch- diameter, galvanized steel wire.

2.2 VAPOR PERMEABLE WEATHER BARRIER/MEMBRANE SYSTEM

- A. Building Membrane Product Basis of Design: Fortifiber Building systems JumboTex
 - 1. Apply Product as a system using manufacturer provided or recommended accessories such as sealants, tapes, and fasteners
 - Two layers of 1-Ply asphalt saturated kraft Grade D breather type sheathing paper
 a. Reference standard UU-B-790a, Type I Grade D Style 2
 - 3. Moisture Vapor Transmission: 35 grams minimum; ASTM F 1249
 - 4. Water Resistance: 30 Minutes ASTM D 779
- B. Self Adhered Flashing Basis of Design: DuPont FlexWrap
 100% butyl-based adhesive flashing system

2.3 ACCESSORIES

- A. General: ASTM C 1063. Coordinate depth of accessories with thicknesses and number of plaster coats required.
- B. Metal Corner Reinforcement: Expanded, large-mesh, diamond-metal lath fabricated from zinc-alloy or welded-wire mesh fabricated from 0.0475-inch- diameter, zinc-coated (galvanized) wire and specially formed to reinforce external corners of portland cement plaster on exterior exposures while allowing full plaster encasement.
 - 1. Zinc Alloy: Minimum 0.0207 inch thick.
- C. Cornerbeads: Small nose cornerbeads with expanded flanges of large-mesh diamond-metal lath allowing full plaster encasement.
 - 1. Material: Zinc alloy.
- D. Casing Beads: Square-edged style, with expanded flanges.
 - 1. Material: Zinc alloy
- E. Control Joints: Prefabricated with removable protective tape on plaster face of control joints.
 - 1. Material: zinc alloy with expanded diamond lath flanges
 - 2. Type: One-piece, M-shaped folded pair of nonperforated screeds with expanded or perforated flanges

- F. Decorative Channel Screed
 - 1. type: PCS-100-100 extruded aluminum channel screed by Fry Reglet or similar
 - a. 6063 T5 alloy aluminum
 - 2. Size reveal width: 1 inch
 - 3. depth: for 3 coat 5/8" stucco
- G. Foundation Sill (Weep) Screed: Manufacturer's standard profile designed for use at sill plate line to form plaster stop and prevent plaster from contacting damp earth, fabricated from zinc-coated (galvanized) steel sheet.
- H. Lath Attachment Devices: Material and type required by ASTM C 1063 for installations indicated.

2.4 PLASTER MATERIALS

- A. Base-Coat Cements: Portland cement, ASTM C 150, Type I.
- B. Acrylic-Based Finish Coat: Factory-mixed formulation of acrylic emulsion, colorfast mineral pigments, and fine aggregates specifically recommended by acrylic-based finish manufacturer for use over portland cement plaster base coats.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dryvit Systems, Inc.
 - b. Sto Industries.
 - c. El Rey
- C. Lime: Special hydrated lime for finishing purposes, ASTM C 206, Type S; or special hydrated lime for masonry purposes, ASTM C 207, Type S.
- D. Sand Aggregate for Base Coats: ASTM C 897.

2.5 MISCELLANEOUS MATERIALS

- A. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminates, manufactured for use in portland cement plaster.
- B. Water for Mixing and Finishing Plaster: Potable.
- C. Bonding Agent: ASTM C 932.
- D. Asphalt-Saturated Felt: ASTM D 226, Type I (No. 15), nonperforated.
- E. Line Wire: 0.0475-inch- diameter, zinc-coated (galvanized), soft, annealed steel wire.
- F. Steel Drill Screws:
 - 1. ASTM C 1002 for fastening metal lath to wood or steel members less than 0.033 inch thick.
 - 2. Steel drill screws complying with ASTM C 954 for fastening metal lath to steel members 0.033 to 0.112 inch thick.

2.6 PLASTER MIXES AND COMPOSITIONS

- A. General: Comply with ASTM C 926.
 - 1. Base-Coat Mixes and Compositions: Adjust mix proportions within limits specified to attain workability.
 - 2. Fiber: Not to exceeding 1 lb/cu. ft. of cementitious materials. Add to mixes according to fiber manufacturer's written instructions after other mix components have been mixed at least 2 minutes. Reduce aggregate quantities accordingly to maintain workability.
- B. Three-Coat Work over Metal Lath:
 - 1. Scratch and Brown Coat Mixes: Scratch, 1 part portland cement, 0 to 3/4 parts lime, 2-1/2 to 4 parts aggregate; brown, 1 part portland cement, 0 to 3/4 parts lime, 3 to 5 parts aggregate
- C. Acrylic-Based Finish Coat: Apply material as factory packaged; do not add other ingredients; comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 WEATHER-PROOFING MEMBRANE

- A. Apply membrane in accordance with manufacturers recommendations, laid smooth without folds or bunches of material
 - 1. Seam overlap: as recommended by manufacturer for specific material and application indicated in drawings.
 - 2. Sealing: seal edges and items projecting though vapor retarders and barriers
- B. Inspect and repair membrane prior to application of finish material over membrane, tape tears, perforations, and similar damage.
- C. Apply self-adhered flashing for all window, doors, and other openings in stucco plaster assemblies in accordance with manufacturers recommendations.
 - 1. flashing shall seal tight to weather-proofing membrane around perimeter of opening, tape joints and repair damage to flashing prior to installation of finish.

3.2 LATH AND FURRING INSTALLATION, GENERAL

- A. Standards: Comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and ASTM C 1063.
- B. Install supplementary framing, blocking, and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, handrails, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable written instructions of lath and furring manufacturer.
- C. Isolation: Where lathing and metal support system abut building structure horizontally and where partition or wall abuts overhead structure, isolate from structural movement to prevent transfer of loading from building structure.
 - 1. Frame both sides of control joints independently and do not bridge joints with furring and lathing or accessories.

D. Install additional framing, furring, runners, lath, and beads, as required to form openings and frames for other work as indicated. Coordinate support system for proper support of framed work that is not indicated to be supported independently of metal furring and lathing system.

3.3 LATHING

- A. Install where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with referenced ML/SFA specifications and ASTM lathing installation standards.
 - 1. Suspended and Furred Ceilings: Use flat, diamond-mesh lath.
 - 2. Exterior Sheathed Vertical Wall Surfaces: Use woven-wire lath
 - 3. Exterior Sheathed Horizontal Sills and Parapet Coping: Use expanded diamond mesh lath

3.4 PREPARATIONS FOR PLASTERING

- A. Protect contiguous Work from damage and deterioration caused by plastering with temporary covering and other provisions necessary.
- B. Refer to Division 7 Sections for installing flashing.

3.5 PLASTERING ACCESSORIES INSTALLATION

- A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering.
 - 1. External Corners: Install corner reinforcement at external corners
 - 2. Terminations of Plaster: Install casing beads, unless otherwise indicated.
 - 3. Control Joints: Install at locations indicated or, if not indicated, at locations complying with the following criteria and approved by Architect:
 - a. Where an expansion or contraction joint occurs in surface of construction directly behind plaster membrane.
 - b. Distance between Control Joints: Not to exceed 18 feet in either direction or a length-towidth ratio of 2-1/2 to 1.
 - c. Wall Areas: Not more than 144 sq. ft..
 - d. Horizontal Surfaces: Not more than 100 sq. ft. in area.
 - e. Where plaster panel sizes or dimensions change, extend joints full width or height of plaster membrane.

3.6 PLASTER APPLICATION

- A. Plaster Application Standard: Comply with ASTM C 926.
 - 1. Mixing: Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.
 - 2. Do not use materials that are frozen, caked, lumpy, dirty, or contaminated by foreign materials.
 - 3. Do not use excessive water in mixing and applying plaster materials.

- B. Flat Surface Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed at any location on surface.
- C. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, and before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches at each jamb anchor.
- D. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.
- E. Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where interior plaster is not terminated at metal frame by casing beads, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
- F. Corners: Make internal corners and angles square; finish external corners flush with cornerbeads on interior work, square and true with plaster faces on exterior work.
- G. Number of Coats:
 - 1. Metal Lath: Three coats.
- H. Finish Coats:
 - 1. Float Finish: Apply finish coat to a minimum thickness of 1/8 inch to completely cover base coat, uniformly floated to a true even plane with fine-textured finish matching sample.
 - 2. Trowel-Textured Finish: Apply finish coat with hand-troweled-textured finish matching sample.
 - 3. Prepared Finish: Apply stucco finish coats, acrylic-based finish coats, and other factory-prepared finish coats according to manufacturer's written instructions.

3.7 CUTTING, PATCHING, AND CLEANING

- A. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.
- B. Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plastering work.

END OF SECTION 09_2423

SECTION 09 2600 GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood stud wall framing.
- B. Metal channel ceiling framing.
- C. Acoustic insulation.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Textured finish system.
- G. Water-resistive barrier over exterior wall sheathing.

1.02 RELATED SECTIONS

- A. Section 06 1000 Rough Carpentry: Building framing and sheathing.
- B. Section 06 0100 Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 07 9213 Joint Sealers: Acoustic sealant.

1.03 REFERENCES

- A. ASTM C 475/C 475M Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002.
- B. ASTM C 645 Standard Specification for Nonstructural Steel Framing Members; 2007.
- C. ASTM C 665 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2006.
- D. ASTM C 754 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2004.
- E. ASTM C 840 Standard Specification for Application and Finishing of Gypsum Board; 2007.
- F. ASTM C 1396/C 1396M Standard Specification for Gypsum Board; 2006a.
- G. ASTM E 72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 2005.
- H. ASTM E 90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2004.
- I. ASTM E 413 Classification for Rating Sound Insulation; 2004.
- J. GA-216 Application and Finishing of Gypsum Board; Gypsum Association; 2007.

1.04 SUBMITTALS

- A. See Section 01 3300 Submittal Procedures, for submittal procedures.
- B. Test Reports: For all stud framing products that do not comply with ASTM C 645 or C 754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

A. Maintain one copy of all installation standards at project site.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C 840 and GA-216.
- B. Interior Partitions Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E 413, based on tests conducted in accordance with ASTM E 90.

2.02 FRAMING MATERIALS

- A. Manufacturers Metal Framing, Connectors, and Accessories:
 - 1. Clark Western Building Systems: www.clarkwestern.com.
 - 2. Dietrich Metal Framing: www.dietrichindustries.com.
 - 3. Marino-Ware: www.marinoware.com.
 - 4. The Steel Network Inc: www.SteelNetwork.com.
 - 5. Substitutions: See Section 01600 Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated..
 - 1. Exception: The minimum metal thickness and section properties requirements of ASTM C 645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E 72 using assemblies specified by ASTM C 754.
 - 4. Ceiling Channels: C shaped.
- C. Ceiling Hangers: Type and size as specified in ASTM C 754 for spacing required.
- D. Wood studs per spacing and type indicated on drawings.

2.03 GYPSUM BOARD MATERIALS

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com.
 - 2. G-P Gypsum Corporation: www.gp.com/gypsum.
 - 3. National Gypsum Company: www.nationalgypsum.com.
 - 4. Substitutions: See Section 01600 Product Requirements.
- B. Gypsum Wallboard: ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.
 - 1. Regular Type:
 - a. Application: Use for vertical surfaces, unless otherwise indicated.
 - b. Thickness: 5/8 inch, as indicated.
 - c. Edges: Tapered.
 - 2. Fire Resistant Type: Complying with Type X requirements; UL or WH rated.
 - a. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X.
 - b. Thickness: 5/8 inch, as indicated.
 - c. Edges: Tapered.
 - 3. Ceiling Board: Special sag-resistant type.
 - a. Application: Ceilings, unless otherwise indicated.
 - b. Thickness: 1/2 inch.
 - c. Edges: Tapered.
- C. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M; ends square cut.
 - 1. Application: Vertical surfaces behind thinset tile, except in wet areas.
 - 2. Core Type: Regular and Type X, as indicated.
 - 3. Thickness: 1/2 inch, 5/8 inch, as indicated.
 - 4. Edges: Tapered.
- D. Gypsum Sheathing Board: As specified in Section 06100.

2.04 ACCESSORIES

- A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced. Thickness: _____inch.
- B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
- C. Water-Resistive Barrier: No. 15 asphalt felt.
- D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
- E. Textured Finish Materials: Latex-based compound; plain.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- B. Suspended Ceilings and Soffits: Space framing and furring members as required to meet performance requirements.
- C. Wood Studs: Space studs as permitted by standard.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling plate securely to ceiling in accordance with industry standards.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.04 GYPSUM BOARD INSTALLATION

A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
- B. Corner Beads: Install at external corners, using longest practical lengths.

3.06 JOINT TREATMENT

A. 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.

3.07 TEXTURE FINISH

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.
- B. Levels for Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-216.
 - 1. Level 1 for ceiling plenum areas, concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
 - 2. Level 2 where panels form substrates for tile.
 - 3. Level 4 for gypsum board surfaces exposed to view unless noted otherwise.
 - 4. Level 5 for gypsum board surfaces exposed to view at Dining Rooms & Pool.

GYPSUM BOARD ASSEMBLIES

3.08 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 09_2600

SECTION 09_3113 – CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Section "Special Requirements for Protection of Concrete Slabs" for ongoing testing by the General Contractor of relative humidity of all concrete slabs to receive floor finishes.
- B. This Section includes the following:
 - 1. Ceramic Wall tile.
 - 2. Ceramic Floor tile.
 - 3. Tile trim.
 - 4. Waterproof membrane for thin-set tile installations.
 - 5. Metal edge strips installed as part of tile installations.
- C. Related Sections:
 - 1. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 2. Division 09 Section "Portland Cement Plastering" for portland cement scratch coat over metal lath on wall surfaces.

1.2 DEFINITIONS

- A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.
- B. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.3 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.6.
 - 2. Step Treads: Minimum 0.6.
 - 3. Ramp Surfaces: Minimum 0.8.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- C. Samples for Verification:

- 1. Full-size units of each type and composition of tile and for each color and finish required.
- 2. Assembled samples with grouted joints for each type and composition of tile and for each color and finish required, at least 12 inches square and mounted on rigid panel. Use grout of type and in color or colors approved for completed work.
- 3. Full-size units of each type of trim and accessory for each color and finish required.
- 4. Metal edge strips in 6-inch lengths.
- D. Product Certificates: For each type of product, signed by product manufacturer.
- E. Material Test Reports: For each tile-setting and -grouting product.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile from one source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
 - 1. Crack isolation membrane.
 - 2. Joint sealants.
 - 3. Cementitious backer units.
 - 4. Metal edge strips.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of each type of floor tile installation.
 - 2. Build mockup of each type of wall tile installation.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.
- F. Installer Qualifications: Submit documentation that the flooring contractor employs installers that have:
 - 1. Completed three (3) commercial projects of similar scope, square footage and complexity.
 - 2. Are trained and/or certified by the flooring material manufacturer for installation of the flooring product specified.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.
- B. Concrete Curing: Do not install flooring material over concrete substrates unless substrates meet flooring, adhesive, or crack suppression membrane manufacturer's current requirements for bond test, calcium chloride test, relative humidity test and pH test.

1.8 EXTRA MATERIALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
 - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 **PRODUCTS, GENERAL**

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.

- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
- E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.3 TILE PRODUCTS

- A. Manufacturers: As indicated in Finish Legend on Drawings.
- B. Ceramic Floor and Wall Tile, T-1:
 - 1. Composition: Glazed Porcelain
 - 2. Facial Dimensions: As indicated in Finish Legend on Drawings.
 - 3. Thickness: As indicated in Finish Legend on Drawings.
 - 4. Face: Pattern of design as indicated in Finish Legend on Drawings.

2.4 WATERPROOFING FOR THIN-SET TILE INSTALLATIONS

- A. General: Manufacturer's standard product that complies with ANSI A118.10.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 - a. Basis-of-Design Product: Laticrete International, Inc.; Hydro Ban

2.5 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.
 - 1. Basis-of-Design Product: Laticrete International, Inc.; Laticrete 125 Sound and Crack Adhesive

2.6 SETTING AND GROUTING MATERIALS

- A. Basis-of-Design Product: Laticrete International, Inc.; Laticrete 125 Sound and Crack Adhesive
- B. Chemical-Resistant, Water-Cleanable, Tile-Setting and -Grouting Epoxy: ANSI A118.3.

1. Basis-of-Design Product: As indicated in Finish Legend of Drawings

2.7 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."
 - 1. Products:
 - a. Laticrete; Latisil
 - b. Dow Corning Corporation; Dow Corning 786.
 - c. GE Silicones; Sanitary 1700.
 - d. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
 - e. Tremco, Inc.; Tremsil 600.
 - 2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.8 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic, designed specifically for flooring applications; exposed-edge material as indicated in the Drawings.
- C. Temporary Protective Coating: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 - 1. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bonsal American; an Oldcastle company; Grout Sealer.
 - b. Bostik, Inc.; CeramaSeal [Grout & Tile Sealer] [Magic Seal] [Silox 8] [Siloxane 220].
 - c. C-Cure; Penetrating Sealer 978.
 - d. Custom Building Products; [Surfaceguard] [Grout and Tile] [Grout] Sealer.
 - e. Jamo Inc.; [Matte Finish] [Penetrating] Sealer.
 - f. MAPEI Corporation; KER [003, Silicone Spray Sealer for Cementitious Tile Grout] [004, Keraseal Penetrating Sealer for Unglazed Grout and Tile].
 - g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.

2.9 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's current written recommendations to ensure adhesion of floor coverings. Refer to Division 3 cast-in-place concrete for further requirements.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that could have a detrimental effect.
 - 2. Perform floor moisture, alkalinity, and bond tests in accordance with flooring manufacturer's current written directives. Proceed with flooring installation only after all tests meet flooring manufacturer's requirements.
- C. If any of the above flooring, adhesive or crack suppression membrane manufacturer's current test requirements are not in compliance, architect shall be notified in writing. Work shall not proceed until slab is in compliance.

- D. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.
- E. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- F. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- G. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- H. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage.
 - a. Tile floors in wet areas.
 - b. Tile floors in laundries.
 - c. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - d. Tile floors composed of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

- E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 1. Glazed Wall and Floor Tile: 1/8 inch.
- F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate expansion joints in tile surfaces as shown in Drawings.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
 - 3. Do not extend waterproofing or crack isolation membrane under thresholds set in latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on waterproofing or crack isolation membrane with elastomeric sealant.
- H. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

3.4 TILE BACKING PANEL INSTALLATION

A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.7 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be

cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

- 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 09_3113

SECTION 09_5113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Acoustical panels and exposed suspension systems for ceilings.
 - 2. Wood veneer ceiling panels and exposed suspension systems for ceilings.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For components with factory-applied color finishes.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- D. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from a single manufacturer.
 - 3. Wood veneer ceiling panel: Obtain each type through one source from a single manufacturer.
- B. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Panel and for Lay-in Panel Ceilings."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver ceiling panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

- B. Before installing ceiling panels, permit them to reach room temperature and a with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees F or greater than 86 degrees F.
- C. Handle ceiling panels carefully to avoid chipping edges or damaging units in any way.

1.6 **PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Wood veneer ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Extra materials shall be provided to the Owner in unopened factory packaging.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 5.0 percent of quantity installed.
 - 2. Wood Veneer Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
- B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type and as indicated in Finish Legend on Drawings.

- C. Size: See Finish Legend on Drawings (sheet A3-701 and associated Reflected Ceiling Plans).
- D. Basis of Design Standards

1. Tegular Ceiling Tile (ACT-1):

- a. System shall be 24" x 48" x ³/₄" mineral fiber tile, non-directional texture with HumiGuard and BioBlock humidity and mold/mildew protection.
- b. Minimum NRC = 0.70
- c. Minimum CAC = 35

2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch- (3.5mm-) diameter wire.
- E. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- F. Basis of Design Standards
 1. 2x4 lay-in: 9/16" Exposed Tee System, Interlude by Armstrong Ceiling Systems

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILINGS

- A. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 15/16-inch-wide metal caps on flanges.
 - 1. Structural Classification: Intermediate-duty system.
 - 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Steel or aluminum cold-rolled sheet.
 - 5. Cap Finish:
 - a. As selected from manufacturer's full line of available colors
- B. Technical Zone, HVAC and Lighting suspension strip system:
 - 1. Techzone system as manufactured by Armstrong.

2. Technical zone width: 6" in configuration shown on drawings

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Available Manufacturers:
 - 1. Armstrong World Industries, Inc.
 - 2. Celotex Corporation; Architectural Ceilings Marketing Dept.
 - 3. USG Interiors, Inc.
- B. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
- C. Exposed Perimeter Trim: Basis-of-Design to be Axiom Classic straight 4" trim channel profile by Armstrong Ceiling Systems. All mitered corner intersections shall be provided by factory, field mitered intersections will NOT be acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 **PREPARATION**

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, GENERAL

- A. General: Install panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent

devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

- 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
- 5. Do not attach hangers to steel deck tabs.
- 6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
- 7. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- C. Install edge moldings and trim of type indicated at perimeter of panel ceiling area and where necessary to conceal edges of ceiling panels.
 - 1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet Miter corners accurately and connect securely.
 - 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install ceiling panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. Arrange directionally patterned acoustical panels as indicated in the Drawings.
 - 2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09_5113

SECTION 09_6400 - WOOD FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes factory finished wood flooring, and necessary accessories for a complete and functional wood floor system.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of wood flooring and accessory.

1.3 QUALITY ASSURANCE

A. Softwood Flooring: Comply with WCLIB No. 17 grading rules for species, grade, and cut.

1.4 PROJECT CONDITIONS

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
 - 1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
 - 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
 - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
 - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 WOOD FLOORING

A. Solid-Wood Flooring: Kiln dried to 6 to 9 percent maximum moisture content, tongue and groove and end matched, and with backs channeled.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aacer Flooring, LLC.
 - b. Anderson Hardwood Floors.
 - c. Armstrong World Industries, Inc.
 - d. Bellawood.
 - e. Carlisle Wide Plank Floors.
 - f. EcoTimber.
 - g. International Hardwood Flooring, Inc.
 - h. Kentucky Wood Floors.
 - i. Miller and Company, Inc.
 - j. Oregon Lumber Company.
 - k. Sandy Pond Hardwoods, Inc.
 - 1. WD Flooring, LLC.
 - m. Yesteryear Floorworks Company.
- 2. Species and Grade: White Oak.
- 3. Cut: Plain sawn.
- 4. Thickness: **3/4 inch**.
- 5. Face Width: **5 inches**.
- 6. Lengths: Manufacturer's standard.
- 7. Finishing: Factory.

2.2 FACTORY FINISHING

- A. Finish: UV urethane.
 - 1. Color: As selected by Architect in manufacturer's full range.

2.3 ACCESSORY MATERIALS

- A. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than **6.0 mils** thick.
- B. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.
- C. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines: Wood Flooring."
- D. Thresholds and Saddles: To match wood flooring. Tapered on each side.
- E. Reducer Strips: To match wood flooring. 2 inches wide, tapered, and in thickness required to match height of flooring.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed **200 sq. ft.**, and perform no fewer than two tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- B. Concrete Slabs: Grind high spots and fill low spots to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.
 - 1. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring.
- B. Provide expansion space at walls and other obstructions and terminations of flooring of not less than 1/2 inch.
- C. Vapor Retarder: Comply with NOFMA's "Installing Hardwood Flooring" for vapor retarder installation and the following:
 - 1. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.

3.3 PROTECTION

A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.

END OF SECTION 09_6400

SECTION 09_6500 - RESILIENT FLOORING, BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Resilient sheet flooring (RSF).
 - 2. Resilient wall base and accessories (RB).

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units of each color and pattern of resilient floor tile required.
 - 1. Resilient Wall Base and Accessories: Manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long, of each resilient product color and pattern required.
 - 2. Flooring: Manufacturer's standard-size Samples, but not less than 12 inches (300 mm) square, of each resilient product color and pattern required.
- C. Maintenance Data: For finishes, include in maintenance manuals.
- D. Warranty Data: For each type of product indicated.
- E. Material Certifications and Test Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Submit documentation that the flooring contractor employs installers that have:
 - 1. Completed three (3) commercial projects of similar scope, square footage and complexity.
 - 2. Are trained and/or certified by the flooring material manufacturer for installation of the flooring product specified.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store rolls upright.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C) in spaces to receive floor coverings during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install floor coverings after other finishing operations, including painting, have been completed.
- F. Concrete Curing: Do not install flooring material over concrete substrates unless substrates meet flooring manufacturer's requirements for bond test, calcium chloride test, relative humidity test and pH test.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Sheet Covering: Furnish quantity not less than 10 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each color, pattern, and type of floor covering installed.

1.8 WARRANTY

- A. Warrantee: One (2) year general replacement warrantee.
 - 1. Warrant materials and workmanship against defects after completion and final acceptance of Work.
 - 2. Repair defects: By replacing with new materials; from faulty products, materials, workmanship or installation that develop during guarantee period at no expense to Owner.
- B. Additional Limited Warranty: Provide Manufacturer's standard five (5) year product guarantee.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles or a comparable product.

2.2 COLORS AND PATTERNS

A. Colors and Patterns: As indicated on Drawings.

2.3 **RESILIENT WALL BASE**

- A. Wall Base (RB-1): ASTM F 1861.
 - 1. Manufacturer: As indicated on Drawings.
 - 2. Type: Rubber
 - 3. Group: I, solid
 - 4. Style: Cove (with top-set toe).
 - 5. Minimum Thickness: 0.125 inch (3.17 mm).
 - 6. Height: 4 inches (102 mm) unless otherwise noted.
 - 7. Lengths: Coils in manufacturer's standard length.
 - 8. Outside Corners: pre-molded.
 - 9. Inside Corners: pre-molded.
 - 10. Surface: Smooth.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
 - 1. Use adhesives that have a VOC content of not more than 60 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Seamless-Installation Accessories:
 - 1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - a. Color: Match floor covering.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's current written recommendations to ensure adhesion of floor coverings. Refer to Division 3 cast-in-place concrete for further requirements.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that could have a detrimental effect.
 - 2. Perform floor moisture, alkalinity, and bond tests in accordance with flooring manufacturer's current written directives. Proceed with flooring installation only after all tests meet flooring manufacturer's requirements.
 - 3. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- C. If any of the above flooring manufacturer's test requirements are not in compliance, architect shall be notified in writing. Work shall not proceed until slab is in compliance.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- E. Do not install floor coverings until they are same temperature as space where they are to be installed.
 - 1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- F. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SHEET FLOORING INSTALLATION

- A. Comply with manufacturer's current written instructions for installing floor coverings.
- B. Unroll floor coverings and allow them to stabilize before cutting and fitting.
- C. Lay out floor coverings as follows:
 - 1. Maintain uniformity of floor covering direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
 - 3. Match edges of floor coverings for color shading at seams.
 - 4. Avoid cross seams.
- D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and builtin furniture including cabinets, pipes, outlets, and door frames.
- E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.

- F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Seamless Installation:
 - 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.
 - 2. Chemically-Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless floor covering. Prepare seams and apply compound to produce tightly-fitted seams without gaps, overlays, or excess bonding compound on floor covering surfaces.
- J. Comply with manufacturer's current written instructions for installing resilient base.
- K. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- L. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- M. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- N. Do not stretch resilient base during installation.
- O. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's current written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's current written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing flooring installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.

- C. Protect flooring products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
- E. Cover flooring until Substantial Completion.

END OF SECTION 09_6500

SECTION 09_6813 – TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Section "Special Requirements for Protection of Concrete Slabs" for ongoing testing by the General Contractor of relative humidity of all concrete slabs to receive floor finishes.

1.2 SUMMARY

- A. This Section includes modular, tufted carpet tile.
- B. Related Sections include the following:
 - 1. Division 09 Section Resilient Base and Accessories for resilient wall base and accessories installed with carpet tile.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's current written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of edge, transition, and other accessory strips.
 - 9. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
 - 3. Coordinate first paragraph below with qualification requirements in Division 01 Section "Quality Requirements" and as supplemented in "Quality Assurance" Article.
 - 4. Qualification Data: For Installer.
 - 5. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.
 - 6. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
- a. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
- b. Precautions for cleaning materials and methods that could be detrimental to carpet tile.
- 7. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Submit documentation that the flooring contractor employs installers that have:
 - 1. Completed three (3) commercial projects of similar scope, square footage and complexity.
 - 2. Are trained and/or certified by the flooring material manufacturer for installation of the flooring product specified.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - 1. Review delivery, storage, and handling procedures.
 - 2. Review ambient conditions and ventilation procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

1.6 PROJECT CONDITIONS

- A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
- B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.
- E. Concrete Curing: Do not install flooring material over concrete substrates unless substrates meet flooring manufacturer's requirements for bond test, calcium chloride test, relative humidity test and pH test.

1.7 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Material shall be provided to the Owner in unopened factory packaging.
 - 1. Carpet Tile: One box of Full-size units for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.1 CARPET TILE (CPT-1, CPT-2, CPT-3)

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

TANDUS CENTIVA – MODULAR

- B. Products: As indicated in the Finish Legend on the Drawings:
 - 1. Color: As indicated in the Finish Legend on the Drawings
 - 2. Pattern: As indicated in the Finish Legend on the Drawings
- C. Fiber Content: 100 percent TDX nylon
- D. Dye Method: Solution Dyed
- E. Pile Characteristic: Patterned Loop pile.
- F. Pile Height: 0.187 inch
- G. Stitches: 10.5 stitches per inch
- H. Gauge: 1/12
- I. Primary Backing/Backcoating: Synthetic nonwoven
- J. Secondary Backing: 100% recycled content with Tru Bloc barrier system
- K. Size: As indicated in the Finish Legend on the Drawings
- L. Applied Soil-Resistance Treatment: Manufacturer's standard material

- M. Performance Characteristics: As follows:
 - 1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm
 - 2. Delamination: No delamination per ASTM D 3936.
 - 3. Antimicrobial Activity: No added antimicrobials
 - 4. Electrostatic Propensity: 3.0 kV or lower per AATCC 134.
 - 5. Environmental Requirements: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program; provide carpet tile that complies with testing and product requirements of NSF-140 Platinum Standard.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Factory-applied, water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 - 1. VOC Limits: Provide adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's current written recommendations to ensure adhesion of floor coverings. Refer to Division 3 cast-in-place concrete for further requirements.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that could have a detrimental effect.

- 2. Perform floor moisture, alkalinity, and bond tests in accordance with flooring manufacturer's current written directives. Proceed with flooring installation only after all tests meet flooring manufacturer's requirements.
- C. If any of the above flooring manufacturer's test requirements are not in compliance, architect shall be notified in writing. Work shall not proceed until slab is in compliance.
- D. Use trowelable leveling and patching compounds, according to manufacturer's current written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's current written instructions.
- E. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- F. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's current written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09_6813

SECTION 09_7213 – FIBER-REINFORCED PLASTIC (FRP) FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fiberglass Reinforced Plastic wall panels (FRP Panels).
 - 2. Provide FRP panels on walls indicated on Drawings.
 - 3. Provide FRP panels on Custodial Closet walls, 4 feet in each direction from the mop sink and where indicated on Drawings.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.
- C. Shop Drawings showing location and extent of each wall panel type. Indicate seams and termination points.
- D. Samples for initial selection in the form of manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available.
- E. Schedule of wall panels using same room designations indicated on Drawings.
- F. Product certificates signed by manufacturers of wall panels certifying that their products comply with specified requirements.
- G. Maintenance data for wall covering to include in the operation and maintenance manual specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed 5 projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Fire-Test-Response Characteristics: Provide wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

- 1. Flame Spread: 25 or less.
- 2. Smoke Developed: 450 or less.

1.5 PROJECT CONDITIONS

- A. Space Enclosure and Environmental Limitations: Do not install wall panels until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.
- B. Lighting: Do not install wall panels until a lighting level of not less than 15 foot-candles is provided on the surfaces to receive wall covering.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by the wall covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, fiberglass reinforced panels that may be incorporated into the Work include, but are not limited to, the following Basis-of-Design. Submit equal or better products for approval under provisions of Substitution requirements, Section 01600.
 - 1. Basis-of-Design: As indicated in the Finish Legend of Drawings.
 - a. Thickness: As indicated in the Finish Legend of Drawings.
 - b. Texture: As indicated in the Finish Legend of Drawings.
 - c. Color: As indicated in the Finish Legend of Drawings.
 - d. Accessories: Moldings at seams and edges as recommended by Manufacturer.
 - e. Height: Full.
 - 2. Alternate Manufacturer: Marlite.

2.2 PHYSICAL PROPERTIES

<u>Property</u>	<u>Test Method</u>	Value (0.075")
Flexural Strength	ASTM D790	14x 10 ³ psi
Flexural Modulus	ASTM D790	0.65 x 10 ⁶ psi
Tensile Strength	ASTM D638	7 x 10 ³ psi
Tensile Modulus	ASTM D638	.95 x 10 ⁶ psi
Barcol Hardness	ASTM D2583	50
Izod Impact Strength	ASTM D256	11 ft-lb/in notched
Gardner Impact Strength	ASTM D5420	35 in-lbs
Coefficient of Linear Thermal Expansion	ASTM D696	1.4 x 10 ⁻⁵ in/in-°F
Water Absorption	ASTM D570	0.38%/24 hrs @ 77°F
R Value	ASTM C1114	0.19 hr-ft ² -°F/Btu
Surface Burning Characteristics	ASTM E84	Class A
Taber Abrasion Resistance	Taber Test	0.005% max wt loss
(cs-17 wheels, 1000 g. wt., 25 cycles)		

2.3 ADHESIVES

A. General: As recommended by manufacturer of fiberglass reinforced panels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for moisture content and other conditions affecting performance of Work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair wall covering's bond, including mold, mildew, oil, grease, incompatible primers, and dirt.
- C. Prepare substrates to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, and defects. Prime new gypsum board with primer recommended by wall panel manufacturer.

3.3 INSTALLATION, GENERAL

- A. General: Comply with manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Install wall panels with no gaps or overlaps. By overlapping and double cutting the seams the vertical joint disappears.
- C. Install seams vertical and plumb as recommended by manufacturer. No horizontal seams.
- D. Remove air bubbles and other defects.

3.4 CLEANING

- A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended by wall covering manufacturer.
- C. Replace strips that cannot be cleaned.

END OF SECTION 09_7213

SECTION 09_9100 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Flat refers to lusterless or matte finish with a gloss range below 15 when measure at an 85-degree meter.
 - 2. Low-sheen Eggshell refers to low-sheen finish with a gloss range between 9% and 15% when measured at a 60-degree meter.
 - 3. Semi-Gloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 - 4. Full-Gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: For each color type of finish-coat material indicated.

1.5 QUALITY ASSURANCE

- A. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5.
 - 1. Wall Surfaces: Provide samples on at least 100 sq. ft..
 - 2. Small Areas and Items: Architect will designate items or areas required.
 - 3. Final approval of colors will be from benchmark samples.

1.6 PROJECT CONDITIONS

A. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

- B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner. Material shall be in manufacturer's original unopened containers.
 - 1. Quantity: 5 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
 - 1. Benjamin Moore & Co. (Benjamin Moore).
 - 2. ICI Dulux Paint Centers (ICI Dulux Paints).
 - 3. Sherwin-Williams Co. (Sherwin-Williams).
 - 4. Dunn Edwards Paints
 - 5. Kwal Paints
 - 6. Diamond Vogel
 - 7. Monopole Inc.
 - 8. Scuffmaster
 - 9. Okon

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Chemical Components of Interior Paints and Coatings: Unless otherwise indicated as specified herein, provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:
 - 1. Flat Paints and Coatings: VOC not more than 50 g/L.

- 2. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
- 3. Anticorrosive Coatings: VOC not more than 250 g/L.
- 4. Varnishes and Sanding Sealers: VOC not more than 350 g/L.
- 5. Stains: VOC not more than 250 g/L.
- 6. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
- 7. Restricted Components: Paints and coatings shall not contain acrolein; acrylonitrile; antimony; benzene; butyl benzyl phthalate; cadmium; di (2-ethylhexyl) phthalate; di-n-butyl phthalate; di-n-octyl phthalate; 1,2-dichlorobenzene; diethyl phthalate; dimethyl phthalate; ethylbenzene; formaldehyde; hexavalent chromium; isophorone; lead; mercury; methyl ethyl ketone; methyl isobutyl ketone; methylene chloride; naphthalene; toluene (methylbenzene); 1,1,1-trichloroethane; or vinyl chloride.
- D. Colors: Match colors as indicated in Finish Legend on Drawings.

2.3 PREPARATORY COATS

- A. Exterior Primer: Exterior alkyd or latex-based primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
 - 1. Ferrous-Metal and Aluminum Substrates: Rust-inhibitive metal primer.
 - 2. Zinc-Coated Metal Substrates: Galvanized metal primer.
 - 3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.
- B. Interior Primer: Interior latex-based low odor, low VOC primer, of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated. Provide Benjamin Moore; Pristine Eco Spec Interior Latex Primer Sealer 231 or equivalent.
 - 1. Ferrous-Metal Substrates: Quick drying, rust-inhibitive metal primer.
 - 2. Zinc-Coated Metal Substrates: Galvanized metal primer.
 - 3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

2.4 EXTERIOR FINISH COATS

- A. Exterior Flat Acrylic Paint:
 - 1. Benjamin Moore; Moorcraft Super Spec Flat Latex House Paint No. 171.
 - 2. ICI Dulux Paints; 2200-XXXX Dulux Professional Exterior 100 Percent Acrylic Flat Finish.
 - 3. Sherwin-Williams; A-100 Exterior Latex Flat House & Trim Paint A6 Series.
- B. Exterior Low-Luster Acrylic Paint:
 - 1. Benjamin Moore; Moorcraft Super Spec Low Lustre Latex House Paint No. 185.
 - 2. ICI Dulux Paints; 2402-XXXX Dulux Professional Exterior 100 Percent Acrylic Satin Finish.
 - 3. Sherwin-Williams; A-100 Exterior Latex Satin House & Trim Paint A82 Series.

- C. Exterior Semi-Gloss Acrylic Enamel:
 - 1. Benjamin Moore; Moorcraft Super Spec Latex House & Trim Paint No. 170.
 - 2. ICI Dulux Paints; 2406-XXXX Dulux Professional Exterior 100 Percent Acrylic Semi-Gloss Finish.
 - 3. Sherwin-Williams; A-100 Latex Gloss A8 Series.
- D. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals:
 - 1. Benjamin Moore; Moore's IMC Acrylic Gloss Enamel M28.
 - 2. ICI Dulux Paints; 3028-XXXX Dulux Interior/Exterior Acrylic Gloss Finish.
 - 3. Sherwin-Williams; DTM Acrylic Coating Gloss (Waterborne) B66W100 Series.
- E. Exterior Full-Gloss Alkyd Enamel:
 - 1. Benjamin Moore; Moore's IMC Urethane Alkyd Enamel M22.
 - 2. ICI Dulux Paints; 4308-XXXX Devguard Alkyd Industrial Gloss Enamel.
 - 3. Sherwin-Williams; Industrial Enamel B-54 Series.
- F. Exterior Satin Finish Clear Wood Sealer:
 - 1. Okon: WeatherPro OK-710

2.5 INTERIOR FINISH COATS

- A. Interior Latex Low-Sheen:
 - 1. Basis-of-Design as shown in Finish Legend on Drawings.
- B. Interior Latex Semi-Gloss:
 - 1. Basis-of-Design as shown in Finish Legend on Drawings.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
- C. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

- 1. Provide barrier coats over incompatible primers or remove and reprime.
- 2. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
- 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - c. If transparent finish is required, backprime with spar varnish.
 - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
 - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
- 4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
- 5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- E. Material Preparation:
 - 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
- F. Exposed Surfaces: Include areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 - 1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 2. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 - 3. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 - 4. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 - 5. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
- G. Sand lightly between each succeeding enamel or varnish coat.
- H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

- 1. Omit primer over metal surfaces that have been shop primed and touchup painted.
- 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
- I. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
- J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
- K. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- L. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- M. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

3.2 CLEANING AND PROTECTING

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
- B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- C. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
 - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces.
- **3.3 EXTERIOR PAINT SCHEDULE** (reference Section 05_0500 "Shop Applied Finishes" for additional information)
 - A. Ferrous Metal:
 - 1. Acrylic Finish: Two finish coats over a rust-inhibitive primer.
 - a. Primer: Exterior ferrous-metal primer (not required on shop-primed items).
 - b. Finish Coats: Exterior Semi-Gloss acrylic enamel.
 - B. Zinc-Coated Metal:
 - 1. Acrylic Finish: Two finish coats over a galvanized metal primer.
 - a. Primer: Exterior galvanized metal primer.
 - b. Finish Coats: Exterior Semi-Gloss acrylic enamel.

- C. Wood Decking:
 - 1. Clear Sealer
 - a. Finish Coats: Two finish coats.

3.4 INTERIOR PAINT SCHEDULE

- A. Gypsum Board:
 - 1. Latex Finish: Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior latex. See Finish Legend on Drawings for color.
 - 2. Waterbase Polyurethane: Tow finish coats over a primer.
 - a. Primer: As directed by manufacturer.
 - b. Finish Coats: Interior waterbase polyurethane. See Finish Legend on Drawings for color and sheen.
- B. Ferrous Metal:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Interior ferrous-metal primer.
 - b. Finish Coats: Interior latex. See Finish Legend on Drawings for color and sheen.
- C. Zinc-Coated Metal:
 - 1. Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Interior zinc-coated metal primer.
 - b. Finish Coats: Interior Semi-Gloss acrylic enamel.
- D. Concrete Floor Slabs:
 - 1. Polyurethane: Two finish coats.
 - a. Finish Coats: Polyurethane.

END OF SECTION 09_9100

SECTION 09_9300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and the application of wood finishes on the following substrates:
 - 1. Exterior Substrates:
 - a. Exposed Structural Roof Decking
 - b. Exposed Structural Beams
 - 2. Interior Substrates:
 - a. Exposed Structural Roof Decking
 - b. Exposed Wood Trusses
 - c. Exposed Beams & Columns
- B. Related Sections include the following:
 - 1. Division 09 Section "Exterior Painting" for surface preparation and application of standard paint systems on exterior substrates.
 - 2. Division 09 Section "Interior Painting" for surface preparation and application of standard paint systems on interior substrates.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product List: For each product indicated, include the following:
 - 1. Refer to Finish Schedule A3-702

1.4 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in its "MPI Approved Products List."

- 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and finish systems indicated.
- B. Mockups: Apply benchmark samples of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of stain color selections will be based on benchmark samples.
 - a. If preliminary stain color selections are not approved, apply additional benchmark samples of additional stain colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F
- B. Do not apply exterior finishes in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed on the Finish Legend of Drawings.

2.2 MATERIALS, GENERAL

- A. Product: Water-based modified acrylic emulsion
- B. Material Compatibility:
 - 1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.
- C. VOC Content of Field-Applied Interior Primers, Stains, and Transparent Finishes: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to primers, stains, and transparent finishes that are applied in a fabrication or finishing shop:
- D. Stain Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
 - 1. Maximum Moisture Content of Wood Substrates: 15 percent when measured with an electronic moisture meter.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes.
 - 3. Begin finish application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 4. Beginning application of finish system constitutes Contractor's acceptance of substrate and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be finished. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, reinstall items that were removed; use workers skilled in the trades involved. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.

- 1. Remove surface dirt, oil, or grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
- 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- 3. Countersink steel nails, if used, and fill with putty tinted to final color to eliminate rust leach stains.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for finish and substrate indicated.
 - 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when finishes are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample finish materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces if, on refinishing with complying materials, the two finishes are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.6 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Finish Carpentry Substrates:

- 1. Semitransparent Stain System:
 - a. Exterior semitransparent stain applied per Manufacturer's instructions

3.7 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Finish Carpentry Substrates:
 - 1. Semitransparent Stain System:
 - a. Interior semitransparent stain applied per Manufacturer's instructions

END OF SECTION 09_9300

DIVISION 10 – SPECIALTIES

SECTION 10_1300 - DIRECTORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Nonilluminated, message-strip directories.
- B. Related Sections:1. Section 10 1400 "Signage" for individual room signs.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Directories shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for directories.
- B. Shop Drawings: For directories. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include sections of typical trim members.
- C. Samples for Initial Selection: For units with factory-applied color finishes, as follows:
 - 1. Fabric swatches for letterboards.
 - 2. Section of header panel for color selection.
- D. Samples for Verification: For each type of directory indicated, as follows:
 - 1. Letterboards: Not less than 8-1/2 by 11 inches (215 by 280 mm), mounted on substrate indicated for final Work. Include one panel for each type, color, and texture required.
 - 2. Trim: 6-inch- (150-mm-) long sections of each trim profile[including corner section].

- 3. Message Strips: Full-size Samples of message strips in color selected with sample of specified typography.
- E. Other Action Submittal:
 - 1. Message-Strip Schedule: Layout of each directory and each message strip showing letter size, font, spacing, indents, text copy, and graphics.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install directories until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - 1. Sheet: ASTM B 209 (ASTM B 209M).
 - 2. Extruded Shapes: ASTM B 221 (ASTM B 221M), Alloy 6063.
- B. Clear Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality q3, with exposed edges seamed before tempering, and 6 mm thick unless otherwise indicated.
- C. Tinted Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type I, Class 2 (tinted), tint as indicated, Quality q3, with exposed edges seamed before tempering, and 6 mm thick unless otherwise indicated.
- D. Fasteners: Provide screws, bolts, and other fastening devices made from same material as items being fastened, except provide hot-dip galvanized, stainless-steel, or aluminum fasteners for exterior applications. Provide types, sizes, and lengths to suit installation conditions. Use security fasteners where exposed to view.

2.2 MESSAGE-STRIP DIRECTORIES

- A. Nonilluminated, Message-Strip Directory: Factory-fabricated unit consisting of changeable message strips held in place by retainer frame enclosed in manufacturer's standard [1-1/2-to-2-inch- (38-to-50-mm-)]
 Insert dimension> deep perimeter frame; with aluminum-sheet rear cover panel and glazed cover.
 - 1. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. <u>Allenite Signs; division of Allen Marking Products, Inc</u>.
 - b. <u>APCO Graphics, Inc</u>.
 - c. <u>ASI-Modulex</u>.
 - d. <u>Best Sign Systems, Inc</u>.

- e. <u>Desk & Door Nameplate Co</u>.
- f. <u>Nelson-Harkins Industries</u>.
- g. <u>Poblocki Sign Company</u>.
- h. <u>Tablet & Ticket Co. (The)</u>.
- i. <u>Visiontron Corp</u>.
- j. <u>Vomar Products, Inc</u>.
- 2. Sectional Frame and Cover: Individual, glazed section covers, each in its own frame, containing single column of message strips. Provide perimeter frame for entire unit. Mount section covers with concealed pivot hinges or continuous hinges and equip with concealed lock.
 - a. Perimeter Frame: Extruded aluminum.
 - b. Perimeter Frame Profile: Square.
 - c. Perimeter Frame Corners: Square.
 - d. Cover Frame: Same material and finish as perimeter frame.
 - e. Glazing: Clear tempered glass.
 - f. Header Panel: Provide copy that complies with requirements indicated on artwork supplied on electronic media by Architect for size, style, spacing, content, height, location, material, and colors of graphics.

2.3 FABRICATION

- A. Fabricate directories to requirements indicated for dimensions, design, and thickness and finish of materials. Use metals and shapes of thickness and reinforcement to produce flat surfaces, free of oil canning, and to impart strength for size, design, and application indicated.
- B. Fabricate directory cabinets and door frames with reinforced corners, mitered and welded to a hairline fit, with no exposed fasteners. Provide structural reinforcement to prevent racking and misalignment.
- C. Message-Strip Directories: Provide blank message strips for each carrier in entire directory.
- D. Message-Strip Directories: Provide message strips with wording and other designations for the locations where wording is indicated. Include blank message strips as needed to fill out remainder of directory.
- E. Provide hold-open arms for doors of top-hinged directories.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper backing for directories.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install directories in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
 - 1. Mounting Height: 72 inches above finished floor to top of directory.
- B. Surface-Mounted Directories: Attach directories to wall surfaces with concealed clips, hangers, or grounds fastened at not more than 16 inches o.c. Secure both top and bottom of directories to walls.

3.3 ADJUSTING AND CLEANING

- A. Adjust directory doors to operate smoothly without warp or bind and so that contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 10_1300

SECTION 10_1400 – BUILDING SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification sections apply to work of this section.

1.2 SUMMARY

- A. This Section includes:
 - 1. Interior room and door signage with changeable message inserts.

1.3 QUALITY ASSURANCE

A. Signs shall be designed and installed for use by handicapped persons in accordance with ANSI A117.7.

1.4 SUBMITTALS

- A. Submit shop drawings listing sign size, letterform and letter heights. Submit manufacturer's product data and installation methods for each type of sign required.
- B. Submit one sample sign of type and style, including method of attachment.
- C. Submit supplier's standard color samples for purposes of color selection of ADA applique. Color samples can be actual materials used in signage or color charts.
- D. Manufacturers must submit 3 references showing products for projects completed within the last 5 years.
- E. Submit copy of manufacturer's product warranty.

1.5 CLOSEOUT DOCUMENTATION

- A. Provide copy of manufacturer's recommended care and cleaning methods
- B. Provide written copy of manufacturer's warranty and contact.
- C. Provide template file to end-user as described in Part 2 Section, paragraph 2.2.A.2.b.

PART 2 - PRODUCTS

2.1 MANUFACTURERS FOR INTERIOR ROOM SIGNS

- A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work, include, but are not limited to the following:
 - Century Sign Builders. 2701 Girard Blvd NE. Albuquerque, NM 87107. Telephone: (505) 888-2901. Fax: (505) 888-2902. Email: <u>hello@csbsigns.com</u>. Website <u>www.csbsigns.com</u>, with Interior Room Identification signs as manufactured by Vista Sign, V-150, 3 x 6 or equal. Provide 8 x 8 or equal for Restroom signs.
 - 2. H&H Building Products; 6805 4th Street NW, Albuquerque, NM. Telephone (505) 344-1747 with Interior Room Identification signs as manufactured by Signsource, 3 x 6 or equal. Provide 8 x 8 or equal for Restroom signs.

2.2 MATERIALS FOR INTERIOR ROOM SIGNS

- A. Interior Signs shall be constructed to be ADA compliant with changeable message inserts and conform to a curved aluminum frame with the following characteristics:
 - 1. ADA Insert:
 - a. Tactile lettering and symbols shall be formed using rotary engraving method and bonded to sign plaque using 3M Scotch 467HP adhesive. Lettering and symbols must have 1/32" return cut to 22 degree angle. Letters and symbols must be constructed with materials having embedded coloration that is the final approved color for the signs. Products with painted or otherwise applied coloration method are not acceptable.
 - b. Text shall be accompanied by Grade 2 Braille on signs requiring Braille.
 - c. All letters, numbers and/or symbols shall have a 70% contrast to the plaque color of the sign as required by ADA regulations.
 - d. Sign plaques, lettering, and symbols shall have a matte or eggshell finish
 - e. Insert Base shall be constructed using 0.0625" single-ply non-glare acrylic multipolymer material.
 - 2. Changeable Insert:
 - a. Changeable message insert will be fabricated from commonly available transparency media that is compatible with inkjet or laser printers.
 - b. Manufacturer will provide template file to end-user allowing for new inserts to be created. Provided file must integrate with client's already existing software environment and must not require the implementation of new or proprietary software.
 - 3. Opaque Insert:
 - a. Opaque graphic insert will be created using any approved printing process. Insert material may include: Printed paper, artistic papers, velum, etc. To be selected by Architect.
 - b. Printed insert must be of high quality and perform within the known limitations of the selected printing process

- 4. Curved Aluminum Sign Frame:
 - a. Provide curved aluminum sign frame as produced by Vista Sign Systems Inc. Produce smooth, curved aluminum based panel sign surfaces with interchangeable faceplates constructed to remain flat under installed conditions and within tolerance of plus or minus .015" when measured diagonally.
 - b. Aluminum frame shall be constructed from curved aluminum extrusions and contoured frame edge profiles with two (2) interlocking screw mounted (Aluminum or ABS Plastic) end caps.
 - c. Aluminum frame shall be capable of containing both the opaque insert and changeable insert behind the clear ADA insert (which it also must contain).
 - d. Aluminum frame allows that inserts are changeable but can not be accessed without a tool or implement. Inserts may be removed with a suction cup.
 - e. Aluminum sign frame shall be satin aluminum.
 - f. ABS plastic end caps shall be available in a gray color. Aluminum end caps shall be satin aluminum.
- 5. Occupancy Indicator:
 - a. Manufacturer's standard occupancy indicator, mounting to bottom of Room Signs where indicated in schedule at end of section.
 - b. Message: "Occupied" or "Vacant" selectable via a manually sliding opaque screening device.

PART 3 - EXECUTION

3.1 INTERIOR ROOM SIGN INSTALLATION

- A. Signs shall be mounted using double vinyl foam tape (1/16" thickness) and silicon adhesive (when necessary) when mounting to wall.
- B. All ADA wall signs shall be mounted 60" from the floor to the center of the sign on the latch side of the door. The distance between the door frame and edge of the sign should be 2". If this condition cannot be met, contact Architect for an alternate location.

3.2 CLEANING AND MAINTENANCE

A. Repair scratches or other minor damage which might have occurred during installation. Clean installed product using only manufacturer recommended products. Remove any construction debris or trash as per Division 1.

3.3 SIGNAGE SCHEDULE

- A. Provide the following Interior Signs. Final Sign Room Numbers and Room Names shall be in compliance with Owner's final room numbering scheme in the Shop Drawings. Request final name and number plan from architect.
 - 1. Provide 1 Sign Per Each Room shown on plans, including existing rooms and new rooms. Final room names and numbers shall be provided by architect, final way-finding names and numbers will NOT be the same names and numbers used for construction documents
 - 2. Provide 1 Sign Per Each Women's Restroom Name shown on the Floor Plan using the Women's Symbol.

- 3. Provide 1 Sign Per Each Men's Restroom Name shown on the Floor Plan using the Men's Symbol.
- 4. Provide 1 Sign Per Each Unisex Restroom Name shown on the Floor Plan using a Unisex Symbol.
- 5. Provide Occupancy Indicator at all Procedure Rooms & Exam Rooms.

END OF SECTION 10_1400

SECTION 10_1430 - EXTERIOR SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification sections apply to work of this section.

1.2 SUMMARY

A. This Section includes exterior signage of the following types:
1. Cast metal letters & mounted to exterior concrete monument signs.

1.3 RELATED SECTIONS

- A. Division 2 Excavation and underground conduit distribution.
- B. Division 3 Concrete foundations and mounting pads.
- C. Division 26 Electrical rough-in wiring and connections.

1.4 **REFERENCES**

- A. ASTM B 209/209M Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM B 221/221M Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.5 SYSTEM DESCRIPTION

A. Cast aluminum lettering to be mounted on finished architectural exterior surfaces using stand-off mechanical brackets.

1.6 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings: Showing sign styles, lettering, locations and dimensions of each sign.
 - 1. Indicate component details including, framing, anchorage, design loading, and location of fasteners, and accessories or items required of related Work.

- a. Submit for verification typeface, lettering layout and spelling
- 2. Submit calculations for loadings and stresses of all framing under Professional Engineer's seal who is experienced in design of this Work and licensed at the Project location.
- 3. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- 4. Verification Samples: Two full size samples, representing type, style and colors including method of attachment.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with requirements of ICC/ANSI A117.1 and ADAAG.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results.
- B. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers/Suppliers: Subject to compliance with requirements, manufacturers/Suppliers offering products that may be incorporated into the Work, include, but are not limited to the following:
 - 1. Innerface Sign Systems, Inc.; 5320 Webb Pkwy, Lilburn, GA 30047. Telephone: (770) 921-5566, Toll Free: (800) 445-4796. Fax: (770) 279-1327. Email: Sales@innerfacesign.com.
 - 2. Century Sign Builders; 2701 Girard Blvd., NE, Albuquerque, NM 87107. Telephone (505) 888-2901, Fax (505) 888-2902. Email: <u>hello@csbsigns.com.</u> www.csbsigns.com.
 - 3. H&H Building Products; 6804 4th Street NW, Albuquerque, NM. Telephone (505) 344-1747, with Cast Letters as manufactured by Matthews, and Monument Signs as manufactured by Leeds Architectural Letters, Inc.
 - 4. Cornerstone Companies LLC

2.2 EXTERIOR SIGNS

- A. Cast Metal Letter Series:
 - 1. Type Face and Material: anodized type I clear
 - a. Type Face: Times Roman

- b. Face: Flat
- c. Material: Cast Aluminum alloy #514
- 2. Sizes: 12 inches, 6 inches, and 3 inches unless otherwise indicated on Drawings. Reference Exterior Detail Sheet A-501.
- 3. Finish: mill finish Aluminum, clear anodized.
- 4. Corners: Square.
- 5. Mounting: Rear stud mount projected with stand-offs to hold back-face of lettering minimum 1" from finished face of wall.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until surfaces to receive signs have been finished and finishes are dry and correctly cured.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify electrical and required data connections are available, in the proper locations and ready for use.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 10_1430

SECTION 10_2600 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Corner guards.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes for each impact-resistant wall-protection unit.
- B. Shop Drawings: For each impact-resistant wall-protection unit showing locations and extent. Include sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Corner Guards: 12 inches long
 - 2. Coordinate first paragraph below with qualification requirements in Division 01 Section "Quality Requirements" and as supplemented in "Quality Assurance" Article.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain impact-resistant wall-protection units through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store impact-resistant wall-protection units in original undamaged packages and containers inside wellventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Store materials in a clean, dry locatio0n protected against damage of any kind.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 1. American Floor Products Co., Inc.
 - 2. ARDEN Architectural Specialties, Inc.
 - 3. Balco, Inc.
 - 4. Boston Retail Products.
 - 5. Construction Specialties, Inc.
 - 6. Koroseal Wall Protection Systems
 - 7. IPC Door and Wall Protection Systems; Division of InPro Corporation.

2.2 MATERIALS

- A. High-impact polycarbonate
- B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

2.3 CORNER GUARDS

- A. Surface-Mounted, Transparent-Plastic Corner Guards locations as indicated in Drawings: Fabricated from clear polycarbonate plastic sheet; with formed edges; fabricated with 90-degree turn to match wall condition.
 - 1. Manufacturers:
 - a. Koroseal Wall Protection Systems
 - b. American Floor Products Co., Inc.
 - c. ARDEN Architectural Specialties, Inc.
 - d. Balco, Inc.
 - e. Construction Specialties, Inc.
 - f. IPC Door and Wall Protection Systems; Division of InPro Corporation.
 - g. Pawling Corporation.
 - h. Tepromark International, Inc.
 - 2. Wing Size: 2 inches by 2 inches.
 - 3. Mounting: Countersunk screws through factory-drilled mounting holes.

2.4 FABRICATION

- A. Fabricate impact-resistant wall-protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.
- B. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of work.
 - 1. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall-protection system components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. General: Install impact-resistant wall-protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard, household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 10_2600

SECTION 10_2813 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes toilet room accessories and under lavatory guards.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.
- B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule. Other manufacturers' products with equal characteristics may be considered. See Division 1 Section "Substitutions

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. American Specialties, Inc.
 - 2. Bobrick Washroom Equipment, Inc.
 - 3. Bradley Corporation.
B. Basis-of-Design Product: The design of Toilet and Bath Accessories are listed in the "Toilet and Bath Accessory Schedule" at the end of this Section. Subject to compliance with requirements, provide the named product or a comparable product.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- C. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- D. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

- A. General: One, maximum 1-1/2-inch- diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Angle Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
 - 1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- E. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
 - 1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

TOILET ACCESSORIES

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.
- D. Install under lavatory guards at each lavatory.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

- A. See toilet and bath accessory locations on Drawings.
- B. Items marked CFCI are to be Contractor Furnished Contractor Installed. Contractor to coordinate, provide, and install all necessary blocking, and provide final installation of Furnished item.
- C. Toilet and Bath Accessory Schedule:

Symbol	Description	Manufacturer	Model Number
А	Soap Dispenser	Bradley	#6562 - CFCI
В	Towel Dispenser/Waste Rec.	Bradley	#237 - CFCI
С	Baby Changing Station	Bradley	#962 - CFCI
D	Toilet Paper Dispenser	Bradley	#5123 - CFCI
Е	Grab Bar 36" Length	American Specialties	Series 3200-36 Grab Bar - CFCI
F	Grab Bar 42" Length	American Specialties	Series 3200-42 Grab Bar - CFCI
G	Grab Bar 18" Length	American Specialties	Series 3200-18 Grab Bar - CFCI
Н	Folding Shower Seat	Bradley	#9559 - CFCI
J	Under Lavatory Guard	Truebro	Lav Guard #102, color Gray.
Κ	Mop Rack	American Specialties	38215-5 (surface mount) - CFCI
L	Robe Hook	American Specialties	#120 (surface mount) - CFCI

END OF SECTION 10_2813

SECTION 10_4400 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Portable fire extinguishers.
 - 2. Fire-protection cabinets for portable fire extinguishers.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
 - 1. Fire Extinguishers: Include rating and classification.
 - 2. Fire-Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Maintenance Data: For fire extinguishers and fire-protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - 1. Sheet: ASTM B 209 (ASTM B 209M).
 - 2. Extruded Shapes: ASTM B 221 (ASTM B 221M).
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.3 **PORTABLE FIRE EXTINGUISHERS**

- A. Manufacturers:
 - 1. Larsen's Manufacturing Company.
 - 2. JL Industries
 - 3. Potter Roemer
- B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet indicated.
 - 1. Valves: Manufacturer's standard.
 - 2. Handles and Levers: Manufacturer's standard.
 - 3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- C. Multipurpose Dry-Chemical Type Larson Number MP10 UL-rated A:10-B:C with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.4 FIRE-PROTECTION CABINET FEC

- A. Manufacturers:
 - 1. Larsen's Manufacturing Company.
 - 2. JL Industries
 - 3. Potter Roemer

- B. Cabinet Type: Suitable for fire extinguisher.
- C. Cabinet Material: Enameled-steel sheet.
 - 1. Shelf: Same metal and finish as cabinet.
- D. Semi-recessed Cabinet: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall; with no trim.
- F. Door Material: Aluminum sheet.
- G. Door Style: Fully glazed panel with frame.
- H. Door Glazing: Tempered clear float glass.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide projecting lever handle with cam-action latch.
 - 2. Provide concealed hinge permitting door to open 180 degrees.
- J. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fireprotection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
 - 3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Silk-screened.
 - 3) Lettering Color: White.
 - 4) Orientation: Vertical.

K. Finishes:

- 1. Aluminum: Class I, clear anodic coating complying with AAMA 611
- 2. Steel: Baked enamel.
- 3. Color and Texture: As selected by Architect from manufacturer's full range.

2.5 MOUNTING BRACKETS

- A. Manufacturers:
 - 1. Larsen's Manufacturing Company.
 - 2. JL Industries
 - 3. Potter Roemer
- B. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 1. Color: Red.
- C. Identification: Adhesive or stenciled lettering complying with authorities having jurisdiction for letter style, size, spacing, color and location. Locate on adjacent surface to bracket as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface (gypsum board assemblies, decorative plastic laminate casework, etc.) Orientation shall be vertical.

2.6 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed.
- B. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or undercharged units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire-protection specialties in locations and at mounting heights indicated
 - 1. Fire-Protection Cabinets: 54 inches above finished floor to top of cabinet.
 - 2. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet manufacturer.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10_4400

DIVISION 14 – CONVEYING EQUIPMENT

SECTION 14_2400 - MACHINE ROOM-LESS HYDRAULIC ELEVATORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Hydraulic passenger elevators as shown and specified. Elevator work includes:
 - 1. Standard pre-engineered hydraulic passenger elevators.
 - 2. Elevator car enclosures, hoistway entrances and signal equipment.
 - 3. Jack(s).
 - 4. Operation and control systems.
 - 5. Accessibility provisions for physically disabled persons.
 - 6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
 - 7. Materials and accessories as required to complete the elevator installation.
- B. Related Sections:
 - 1. Division 1 General Requirements: Meet or exceed all referenced sustainability requirements.
 - 2. Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
 - 3. Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
 - 4. Division 5 Metals:
 - a. Providing hoist beams, steel framing, auxiliary support steel and divider beams for supporting guiderail brackets.
 - b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
 - 5. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
 - 6. Division 22 Plumbing:
 - a. Sump pit and oil interceptor.
 - 7. Division 23: Heating and Ventilation:
 - a. Heating and ventilating hoistways.
 - 8. Division 16 Sections:
 - a. Providing electrical service to elevators. (note: fused disconnect switch to be provided as part of elevator manufacture product, see section 2.11 Miscellaneous elevator components for further details.)
 - b. Emergency power supply, transfer switch and auxiliary contacts.
 - c. Heat and smoke sensing devices.
 - d. Convenience outlets and illumination in hoistway and pit.
- C. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Section 300 for hydraulic elevators. State or local requirements must be used if more stringent.
 - 1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
 - 2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
 - 3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.
 - 4. Elevator hoistways shall have barricades, as required.
 - 5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.

- 6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
- 7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
- 8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42" minimum, (48" minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.
- 9. All wire and conduit should run remote from the hoistways.
- 10. When heat, smoke or combustion sensing devices are required, connect to elevator control cabinet terminals. Contacts on the sensors should be sided for 12 volt D.C.
- 11. Install and furnish finished flooring in elevator cab.
- 12. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
- 13. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
- 14. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
- 15. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
- 16. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
- 17. General Contractor shall fill and grout around entrances, as required.
- 18. All walls and sill supports must be plumb where openings occur.
- 19. Locate a light fixture (200 lx / 19 fc) and convenience outlet in pit with switch located adjacent to the access door.
- 20. Provide telephone line, light fixture (200 lx / 19 fc), and convenience outlet in the hoistway at the landing where the elevator controller is located. Typically this will be at the landing above the 1st floor. Final location must be coordinated with elevator contractor.
- 21. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway.
- 22. For signal systems and power operated door: provide ground and branch wiring circuits.
- 23. For car light and fan: provide a feeder and branch wiring circuits to elevator control cabinet.
- 24. Controller landing wall thickness must be a minimum of 8 inches thick. This is due to the controller being mounted on the second floor landing in the door frame on the return side of the door. For center opening doors, the controller is located on the right hand frame (from inside the elevator cab looking out). These requirements must be coordinated between the general contractor and the elevator contractor.
- 25. Cutting, patching and recesses to accommodate hall button boxes, signal fixtures, etc..

1.02 SUBMITTALS

- A. Product data: When requested, the elevator contractor will provide standard cab, entrance and signal fixture data to describe product for approval.
- B. Shop drawings:
 - 1. Show equipment arrangement in the pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
 - 2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
 - 3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
 - 4. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Powder Coat Paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

HYDRAULIC ELEVATORS

- D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- E. Metal Finishes: Upon request, standard metal samples provided.
- F. Operation and maintenance data. Include the following:
 - 1. Owner's Manual and Wiring Diagrams.
 - 2. Parts list, with recommended parts inventory.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An approved manufacturer with minimum fifteen years' experience in manufacturing, installing, and servicing commercial elevators.
 - 1. Must be the manufacturer of the power unit, controller, signal fixtures, door operators cab, entrances, and all other major parts of the elevator operating equipment.
 - a. The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.
 - 2. The manufacturer shall have a documented, on-going quality assurance program.
 - 3. ISO-9001:2000 Manufacturer Certified.
 - 4. ISO-14001:2004 Environmental Management System Certified.
 - 5. LEED Gold certified elevator manufacturing facility.
- B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than fifteen years of satisfactory experience installing elevators equal in character and performance to the project elevators.
- C. Regulatory Requirements:
 - 1. ASME/ANSI A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
 - 2. Building Code: National.
 - 3. NFPA 70 National Electrical Code.
 - 4. NFPA 80 Fire Doors and Windows.
 - 5. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
 - 6. CAN/CSA C22.1 Canadian Electrical Code.
 - 7. CAN/CSA B44 Safety Code for Elevators and Escalators.
 - a. California Department of Public Health Standard Method V1.1–2010, CA Section 01350
- D. Fire-rated Entrance Assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(B), and NFPA 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).
- E. Inspection and testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
 - 1. Arrange for inspections and make required tests.
 - 2. Deliver to the Owner upon completion and acceptance of elevator work.
- F. Product Qualifications:
 - 1. LCA, EPD and HPD data must be provided for all major components of the elevator system.
 - 2. LCA data must be compatible with GaBI Software.
 - 3. Environmental Product Declaration (EPD): Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope.
 - 4. GreenScreen Chemical Hazard Analysis: All ingredients of 100 parts-per-million or greater evaluated using GreenScreen for Safer Chemicals Method v1.2.
 - 5. Health Product Declarations (HPD v2 or later): Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" on-line tool;

HYDRAULIC ELEVATORS

Unknown hazard listed will not be considered acceptable.

1.04 DELIVERY, STORAGE AND HANDLING

A. Manufacturing will deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.05 PROJECT CONDITIONS

A. Prohibited Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

1.06 WARRANTY

A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after completion of installation or acceptance thereof by beneficial use, whichever is earlier.

1.07 MAINTENANCE

- A. Furnish maintenance and call back service for a period of 12 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours, excluding callbacks. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation.
 - 1. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: ThyssenKrupp Elevator Americas
 - 1. Local contact: Elizabeth.Perlinger@ThyssenKrupp.com, (505) 234-9072

2.02 MATERIALS, GENERAL

- A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD, and shall meet the California Department of Public Health Standard Method V1.1–2010, CA Section 01350 as mentioned in 1.03.9 of this specification.
- B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's standard colors, patterns, and finish charts.
- C. Steel:
 - 1. Shapes and bars: Carbon.
 - 2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
 - 3. Finish: Factory-applied baked enamel for structural parts, powder coat for architectural parts. Color selection must be based on elevator manufacture's standard selections.
- D. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness. Laminate selection must be based on elevator manufacture's standard selections.

E. Carpet: By others.

2.03 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support onepiece loads weighing up to 25% of the rated capacity.
- B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
- D. Guide Shoes: Slide guides shall be mounted on top and bottom of the car.
- E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on a steel template that is fastened to the pit floor. Provide extensions if required by project conditions.
- F. Jack: Jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless. Two jacks piped together, mounted one on each side of the car with each having three telescopic sections designed to extend in a synchronized manner when oil is pumped into the Assembly. Each jack section will be guided from within the casing or the plunger assembly used to house the section. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. If applicable, a follower guide shall be furnished for the top of the lower two plungers and be guided by rollers running inside a steel guide channel which is firmly attached to the guide rail system. This plunger guide system shall maintain a stabilized support for the plunger sections. Each Jack Assembly shall have check valves built into the assembly to allow for automatically re-syncing the three plunger sections by moving the jack to its fully contracted position.
- G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the landings and correct for overtravel or undertravel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.
- H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper grade readily biodegradable oil as specified by the manufacturer of the power unit (see Power Unit section 2.04.G for further details).
- I. Pit moisture/water sensor located approximately 1 foot above the pit floor to be provided. Once activated, elevator will perform "flooded pit operation", which will run the car up to the designated floor, cycle the doors and shut down and trip the circuit breaker shunt to remove 3 phase power from all equipment, including pit equipment.
- J. Motorized oil line shut-off valve shall be provided that can be remotely operated from the controller landing service panel. Also a means for manual operation at the valve in the pit is required.

2.04 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit located in the elevator pit consisting of the following items:
 - 1. NEMA 4/Sealed Oil reservoir with tank cover including vapor removing tank breather
 - 2. An oil hydraulic pump.
 - 3. An electric motor.

HYDRAULIC ELEVATORS

- 4. Electronic oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.
- B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.
- C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating motors shall be capable of 80 starts per hour with a 30% motor run time during each start.
- D. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
 - 1. Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
 - 2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
 - 3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
 - 4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.
 - 5. Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.
- E. Solid State Starting: Provide an electronic starter featuring adjustable starting currents.
- F. A secondary hydraulic power source (powered by 110VAC single phase) must be provided. This is required to be able to raise (reposition) the elevator in the event of a system component failure (i.e. pump motor, starter, etc.)
- G. Oil Type: Readily biodegradable that is USDA certified bio based product, ultra-low toxicity, readily biodegradable, energy efficient, high performing fluid made from canola oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives. Especially formulated for operating in environmentally sensitive areas. USDA certified bio based product, 95% bio-based content, per ASTM D6866.

2.05 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted knock down construction.
 - 1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
 - 2. Main landing door & frame finish: Stainless steel panels, no. 4 brushed finish.
 - 3. Typical door & frame finish: Stainless steel panels with no. 4 brushed finish.
- B. Integrated Control System: the elevator controller to be mounted to hoistway entrance above 1st landing. The entrance at this level, shall be designed to accommodate the control system and provide a means of access to critical electrical components and troubleshooting features. See section 2.09 Control System for additional requirements.
- C. At the controller landing, the hoistway entrance frame shall have space to accommodate and provide a lockable means of access (group 2 security) to a 3 phase circuit breaker. See section 2.11 Miscellaneous Elevator Components for further details.
- D. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door

HYDRAULIC ELEVATORS

restriction devices as required by code.

- E. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
 - 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
 - 2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
 - 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- F. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.06 CAR ENCLOSURE

- A. Car Enclosure:
 - 1. Walls: Cab type TKAP, reinforced cold-rolled steel with two coats factory applied baked enamel finish, with applied vertical wood core panels covered on both sides with high pressure plastic laminate.
 - a. Reveals and frieze: #4 brushed stainless steel.
 - 2. Canopy: Cold-rolled steel with hinged exit.
 - 3. Ceiling: Downlight type, #4 brushed stainless steel pan with recessed LED downlights.
 - 4. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with brushed stainless steel.
 - 5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
 - a. Door Finish: Stainless steel panels: No. 4 brushed finish.
 - b. Cab Sills: Extruded aluminum, mill finish.
 - 6. Handrail: Provide 1.5" diameter cylindrical metal on side and rear walls. Handrails shall have a stainless steel, no. 4 brushed finish.
 - 7. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
 - 8. Cab Protection: Provide cab pads buttons and one (1) full set of protection pads.
- B. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station will give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.07 DOOR OPERATION

- A. Door Operation: Provide a direct current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. Closed-loop, microprocessor controlled motor-driven linear door operator, with adjustable torque limits, also acceptable. AC controlled units with oil checks or other deviations are not acceptable.
 - 1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
 - 2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
 - 3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.
 - 4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a

buzzer will sound. When the obstruction is removed, the door will begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors will stop and resume closing only after the obstruction has been removed.

- 5. Limited Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.
- 6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors will recycle closed then attempt to open six times to try and correct the fault.
- 7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors will recycle open then attempt to close six times to try and correct the fault.
- 8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.
- B. Door Protection Devices: Provide a door protection system using 150 or more microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.08 CAR OPERATING STATION

- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Swing return shall have a brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED's shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.
- B. Emergency Communications System: Integral phone system provided.
- C. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

2.09 CONTROL SYSTEMS

- A. Controller: Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.
- B. Elevator control system shall be non-proprietary. An MRM laptop computer with job-specific software for the maintenance, service, and/or troubleshooting of the elevator system shall be furnished to the Owner and permanently left on the job site. The manufacture of the elevator controls and other components must have an established reputation. Their products must have performed satisfactorily under normal conditions in not less than twenty-five other elevator installations of equal or greater capacity and speed for a minimum of one and half years within the United States. Names and addresses of owners and buildings in which the proposed combinations of controllers and elevator components have performed are to be provided to the Owner upon request.
- C. Service Panel to be located outside the hoistway in the controller entrance jamb and shall provide the following functionality/features:
 - 1. Access to main control board and CPU
 - 2. Main controller diagnostics

HYDRAULIC ELEVATORS

- 3. Main controller fuses
- 4. Universal Interface Tool (UIT)
- 5. Remote valve adjustment
- 6. Electronic motor starter adjustment and diagnostics
- 7. Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit
- 8. Operation of auxiliary pump/motor (secondary hydraulic power source)
- 9. Operation of electrical assisted manual lowering
- 10. Provide male plug to supply 110VAC into the controller
- 11. Run/Stop button
- D. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.
- E. Emergency Power Operation: (Battery Lowering 10-DOC) When the loss of normal power is detected, a battery lowering feature is to be activated. The elevator will lower to a predetermined level and open the doors. After passengers have exited the car, the doors will close and the car will shut down. When normal power becomes available, the elevator will automatically resume operation. The battery lowering feature is included in the elevator contract and does not utilize a building-supplied standby power source.

2.10 HALL STATIONS

- A. Hall Stations, General: Buttons shall illuminate to indicate call has been registered at that floor for the indicated direction.
 - 1. Provide one pushbutton riser with faceplates having a brushed stainless steel finish.
 - 2. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Secured Access: Provide controller provisions to interface a security device at both hall stations to secure access into the elevator to authorized users. Fire Service operation will override keypad operation.
 - a. Provide space on hall station faceplate for surface-mounted security device.
 - b. Security device provided, installed, and programmed by others.
- C. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- D. Corridor Call Station Pictograph Signs: Provide hall push button stations with engraved text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.
- B. Lockable three phase circuit breaker with auxiliary contact with shunt trip capability to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb and should be sized according to the National Electrical Code.

- C. Lockable single phase 110V circuit breaker for cab light and fan to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb should be sized according to the National Electrical Code.
- D. Fireman's Lockbox: Provide fireman's lockbox with two (2) keys for each keyed operation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and control space, as constructed and verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. Install elevator systems components and coordinate installation of hoistway wall construction. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
- B. Comply with the National Electrical Code for electrical work required during installation.
- C. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- D. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- E. Lubricate operating parts of system where recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required by A17.1 Code and local authorities having jurisdiction. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.04 ADJUSTING

A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.05 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless stall shall be cleaned with soap and water and dried with a non-abrasive surface; shall not be cleaned with bleached-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.
 - 1. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.06 PROTECTION

A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.07 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.08 ELEVATOR SCHEDULE

- A. Elevator Qty. 1
 - 1. Elevator Model: Endura MRL Twinpost
 - 2. Rated Capacity: 2100 lbs.
 - 2. Rated Speed: 100 ft. /min.
 - 3. Operation System: TAC32
 - 4. Travel: 9'- 2 1/2"
 - 5. Landings: 2 total
 - 6. Openings:
 - a. Front: 2
 - b. Rear: 0
 - 7. Clear Car Inside: 5' 8" wide x 4' 3" deep
 - 8. Cab Height: 8'-0" nominal
 - 9. Hoistway Entrance Size: 3' 0" wide x 7'-0" high
 - 10. Door Type: Single Speed Side Opening
 - 11. Power Characteristics: TBD volts, 3 Phase, 60 Hz.
 - 12. Seismic Design Category: See Structural Notes
 - 13. Fixture & Button Style: Vandal Resistant Signal Fixtures

END OF SECTION 14_2400

DIVISION 22 – PLUMBING

SECTION 22_0500 - BASIC PLUMBING MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Plumbing Basic Requirements specifically applicable to Divisions 21, 22, and 23 in addition to the requirements of Division 1 General Requirements and the General Conditions of the Contract.
 - 2. Plumbing Identification.
 - 3. Sleeves
 - 4. Plumbing sleeve seals.
 - 5. Altitude rating.

1.02 RELATED SECTIONS

- A. Work described in this section is related to other work described in Divisions 21, 22, 23, 27, and 28 and may be related to work in other Divisions concerning structure or appearances. Review and become familiar with work required in other Sections in this Division and with work required in the other Divisions. Coordinate with other subcontractor(s) to assure that all issues arising between related Sections are resolved.
- B. Bring to the attention of the Engineer prior to the cutoff date for Addenda, any and all discrepancies in related work. Submission of a bid or proposal indicates that all costs for this work and related work are included in the bid for this work or within the bid or proposal for the related work.

1.03 SYSTEM DESCRIPTION

A. Provide complete and fully operational systems with facilities and services to meet requirements indicated and in accordance with applicable codes and ordinances.

1.04 REGULATORY REQUIREMENTS

- A. All Plumbing work shall be performed in strict accordance with the New Mexico Building Codes, IBC, UPC, UMC, NFPA, National Gas Code, Model Energy Code, and all applicable provisions of the local authorities having jurisdiction. All materials and labor necessary to comply with rules, regulations, and ordinances shall be provided. Where the drawings and/or specifications indicate material or construction in excess of code requirements or visa-versa, the more stringent application shall govern.
- B. Permits necessary for the performance of the work under this contract shall be secured and paid for by the Contractor. Final inspection by the Engineer will not be made, or certificate of final payment issued, until certificates of satisfactory inspection from the inspection authorities are delivered.

1.05 SUBMITTALS

A. Submit all data as a single package, as the Engineer will commence review only when all data has been received.

BASIC PLUMBING MATERIALS AND METHODS

- B. Submittal form to identify project, contractor, sub-contractor, supplier, and pertinent contract document references.
- C. Apply Contractor's stamp, signed or initialed, certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and contract documents.
- D. The Contractor shall determine and verify field measurements and field construction criteria for conformance with drawings and specifications and for conflicts with other items of construction, past or present. He shall coordinate each submittal with the requirements of the work and of the contract documents and notify the Engineer in writing, at the time of the submission, of any and all deviations in the submittals from requirements of the work and contract documents.
 - 1. No fabrication or work, which requires submittals, shall begin until submittals are returned with the Engineer's approval.
- E. Identify variations for contract documents and product or system limitations, which may be detrimental to successful performance of the completed work.
- F. Engineer's review does not constitute acceptance or responsibility for accuracy or dimensions, nor shall it relieve the Contractor from meeting any requirements of the work and contract documents, nor shall it constitute approval for any deviation from the contract documents, unless such deviations are specifically stated as such on the submittal and specifically allowed by the Engineer by specific written notification for each such variation. The Engineer's review will not relieve the Contractor from responsibility for errors or omissions in the shop drawings.
- G. Revise and resubmit submittals as required. Identify all changes made since previous submittal.
- H. The Engineer will review a submittal and, if necessary, a resubmittal of the same item. Subsequent resubmittals shall be accompanied by Contractor's purchase order to Engineer for Engineer's review time and costs at Engineer's standard hourly billing rates. These reviews will be performed at the convenience of the Engineer.
- I. Provide eight (8) copies of materials for submittal review. If Contractor intends to utilize electronic submittals, one (1) hard copy must still be delivered to Engineer, hard copy will be dated when received and will be the official copy. Engineer will return submittal electronically.

1.06 SUBSTITUTIONS

- A. Prior approval of materials and equipment will not be considered. Contract documents indicate specified equipment and acceptable alternatives. Any other equipment/material proposed must meet or exceed that specified. Equipment/material will be reviewed for compliance during submittal review process per Paragraph 1.5.
- B. Engineer will consider requests for substitutions only at submittal review. Clearly identify substitution.
- C. Document each request with complete data substantiating compliance of proposed substitution with contract documents.
- D. A request for substitution constitutes a representation that the Contractor:

BASIC PLUMBING MATERIALS AND METHODS

- 1. Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product.
- 2. Will provide the same warranty for the substitution as for the specified product.
- 3. Will coordinate installation and make changes to other work, which may be required for the work to be complete with no additional cost to Owner.
- 4. Waives claims for additional costs or time extensions which may, subsequently, become apparent.
- 5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with reapproval by authorities.

1.07 OPERATIONS AND MAINTENANCE DATA

- A. Submit three (3) sets prior to final inspection, in 8-1/2" x 11" text pages, bound in three (3) D-side ring binders with durable plastic covers. Provide one (1) set of original O&M Materials to Project Commissioning Authority no later than 30 days after submittals are approved. O&M package shall not be bound.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.
- C. Internally sub-divide the binder contents with permanent page dividers, logically organized with tab titling clearly printed under reinforced, laminated plastic tabs.

D. Contents:

- 1. Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Sub-contractors, and major equipment suppliers.
- 2. Operation and maintenance instructions arranged by system.
- 3. Project documents and certificates.

1.08 DELIVERY, STORAGE, AND HANDLING

A. In accordance with the requirements of Division 1.

1.09 RECORD AS-BUILT DRAWINGS

- A. Maintain on site one set of record documents exclusively for the purpose of Record As-Built Drawings.
- B. Record into Record Drawings, Project Manual and Product Data, the actual "as-built" Work including all revisions. Include actual location of all work.
- C. Record information concurrent with the construction progress.
- D. Ensure entries are complete and accurate, enabling future references by Owner.
- E. Modify reproducible drawings and two (2) sets of the project manual, delineating recorded as-built conditions of the project or Record Documents compiled from the job records. The Contractor may obtain reproducible drawings from the office of the Architect or Engineer.

- F. Provide electronic (.DWG or.PDF) files of "as-built" conditions. Contractor may obtain electronic drawings from the office of the Architect or Engineer and must modify the electronic record documents. The Contractor shall submit the as-built drawings in electronic format and printed drawings on the medium specified. The Contractor may request Engineer to complete modifications to drawings. Such request must be accompanied by Contractor's purchase order to Engineer for drafting services.
- G. Completion of Record As-Built Drawings is a condition of final inspection and consideration of final payment.

1.10 CLOSEOUT PROCEDURES

- A. See Division 1 for additional closeout procedures.
- B. See Paragraph 3.7 for Substantial Completion and Final Inspection Requirements.

1.11 FINAL INSPECTIONS

A. One final inspection for completion of project will be performed by the Engineer. Any and all additional inspections requested by the Contractor or required because of Contractor's failure to complete scope of work, shall be paid for by the Contractor. Costs for additional inspections shall be assessed at the Engineer's hourly rates.

PART 2 PRODUCTS

2.01 PLUMBING IDENTIFICATION

- A. Equipment Nameplates: Laminated three-layer plastic with engraved black letters on light background color.
- B. Valve Tags: Laminated three-layer plastic with engraved black letters on light background color, minimum 1-1/2 inches diameter.

C. Piping:

- 1. Conform to ASME A13.1.
- 2. Minimum information indicating flow direction arrow and identification of fluid being conveyed.
- 3. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
- 4. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- 5. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.02 SLEEVES

- A. Sleeves for pipes through non-fire rated floors: 18 gage thick galvanized steel.
- B. Sleeves for pipes through non-fire rated beams, walls, footings, and potentially wet floors: steel pipe or 18 gage thick galvanized steel.

BASIC PLUMBING MATERIALS AND METHODS

- C. Sleeves for round ductwork: galvanized steel.
- D. Sleeves for rectangular ductwork: galvanized steel or wood.
- E. Sealant: acrylic

2.03 PLUMBING SLEEVE SEALS

A. Modular Plumbing type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.04 ALTITUDE RATINGS

A. Unless otherwise noted, all specified equipment capacities, air quantities, etc., are for the altitude of the job site, as scheduled on the drawings, and adjustments to manufacturer's ratings must be made accordingly.

PART 3 EXECUTION

3.01 INSTALLATION - IDENTIFICATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Degrease and clean surfaces to receive adhesive for identification materials.
- C. Install plastic nameplates with adhesive.
- D. Install plastic tags with corrosion-resistant metal chain.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Label piping at all changes in direction and at a minimum of every 20 feet of straight runs of pipe.
- G. Record actual location of valves on Project Record Documents.

3.02 INSTALLATION - CONDENSATE AND OVERFLOW DRAINS

A. Install condensate and overflow drain piping from all mechanical equipment drain points. Extend and terminate per UPC/UMC.

3.03 INSTALLATION - SLEEVES

A. Verify openings are ready to receive sleeves.

BASIC PLUMBING MATERIALS AND METHODS

- B. Exterior watertight entries: Seal with Plumbing sleeve seals.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install chrome plated steel or, if allowed by the authority having jurisdiction, plastic escutcheons at finished surfaces.

3.04 SUBSTANTIAL COMPLETION AND FINAL INSPECTION REQUIREMENTS

- A. Before substantial completion can be granted, the following items must be completed and submitted to the Owner/Engineer:
 - 1. An approved Test and Balance Report.
 - 2. Operation test demonstrating proper operation of all equipment.
 - 3. Control diagrams, wiring diagrams, control sequences, and engineering data on components.
- B. Prior to the final inspection or consideration of final payment, the Contractor shall:
 - 1. Provide copies of permits, operating permits, and/or inspection certificates.
 - 2. Provide a check-out report.
- C. Provide operating and maintenance manual(s).
 - 1. Provide record as-built drawings.
 - 2. Return keys to the Owner.
 - 3. Deliver all spare parts.
 - 4. Touch up any damaged finishes.
 - 5. Provide a copy of attendance roster for equipment training sessions.
 - 6. Provide all warrantee certificates and documentation.

END OF SECTION 22_0500

SECTION 22_0719 - PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- B. ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation.
- C. ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
- D. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials.
- F. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials.

PART 2 PRODUCTS

2.01 **REGULATORY REQUIREMENTS**

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- B. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

2.03 JACKETS

A. PVC Plastic.

- 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
- 2. Covering Adhesive Mastic: Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- F. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07_8400.

- H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.
- I. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

3.03 SCHEDULES: Per the 2015 IECC.

END OF SECTION 22_0719

SECTION 22 1005 - PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Flanges, unions, and couplings.
 - 4. Pipe hangers and supports.
 - 5. Valves.

1.02 REFERENCE STANDARDS

- A. ANSI Z21.22 American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- B. ASME B16.1 Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- C. ASME B16.3 Malleable Iron Threaded Fittings: Classes 150 and 300.
- D. ASME B16.4 Gray Iron Threaded Fittings: Classes 125 and 250.
- E. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings.
- F. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
- G. ASME B16.23 Cast Copper Alloy Solder Joint Drainage Fittings DWV.
- H. ASME B16.26 Cast Copper Alloy Fittings for Flared Copper Tubes.
- I. ASME B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings DWV.
- J. ASME B31.1 Power Piping.
- K. ASME B31.9 Building Services Piping.
- L. ASME BPVC-IV Boiler and Pressure Vessel Code, Section IV Rules for Construction of Heating Boilers.
- M. ASME BPVC-IX Boiler and Pressure Vessel Code, Section IX Welding, Brazing, and Fusing Qualifications.

PLUMBING PIPING

- N. ASSE 1003 Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems.
- O. ASTM A47/A47M Standard Specification for Ferritic Malleable Iron Castings.
- P. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- Q. ASTM A74 Standard Specification for Cast Iron Soil Pipe and Fittings.
- R. ASTM A269/A269M Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- S. ASTM B32 Standard Specification for Solder Metal.
- T. ASTM B42 Standard Specification for Seamless Copper Pipe, Standard Sizes.
- U. ASTM B43 Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
- V. ASTM B75/B75M Standard Specification for Seamless Copper Tube.
- W. ASTM B88 Standard Specification for Seamless Copper Water Tube.
- X. ASTM B88M Standard Specification for Seamless Copper Water Tube (Metric).
- Y. ASTM B280 Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- Z. ASTM B302 Standard Specification for Threadless Copper Pipe, Standard Sizes.
- AA. ASTM B306 Standard Specification for Copper Drainage Tube (DWV).
- AB. ASTM B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
- AC. ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
- AD. ASTM C4 Standard Specification for Clay Drain Tile and Perforated Clay Drain Tile.
- AE. ASTM C14 Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
- AF. ASTM C425 Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
- AG. ASTM C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

PLUMBING PIPING

- AH. ASTM C564 Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- AI. ASTM C700 Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
- AJ. ASTM C1053 Standard Specification for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications.
- AK. ASTM D1785 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- AL. ASTM D2235 Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
- AM. ASTM D2239 Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
- AN. ASTM D2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- AO. ASTM D2466 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- AP. ASTM D2513 Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings.
- AQ. ASTM D2564 Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- AR. ASTM D2609 Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
- AS. ASTM D2661 Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
- AT. ASTM D2665 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- AU. ASTM D2680 Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping.
- AV. ASTM D2683 Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
- AW. ASTM D2729 Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- AX. ASTM D2846/D2846M Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems.

- AY. ASTM D2855 Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
- AZ. ASTM D2996 Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
- BA. ASTM D3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- BB. ASTM F437 Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
- BC. ASTM F438 Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
- BD. ASTM F439 Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
- BE. ASTM F441/F441M Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
- BF. ASTM F442/F442M Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).
- BG. ASTM F628 Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core.
- BH. ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
- BI. ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.
- BJ. ASTM F1281 Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.
- BK. ASTM F1282 Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.
- BL. AWS A5.8M/A5.8 Specification for Filler Metals for Brazing and Braze Welding.
- BM. AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings.
- BN. AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- BO. AWWA C151/A21.51 Ductile-Iron Pipe, Centrifugally Cast.

PLUMBING PIPING

- BP. AWWA C606 Grooved and Shouldered Joints.
- BQ. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
- BR. AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service.
- BS. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection, Application, and Installation.
- BT. MSS SP-67 Butterfly Valves.
- BU. MSS SP-70 Cast Iron Gate Valves, Flanged and Threaded Ends.
- BV. MSS SP-71 Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- BW. MSS SP-78 Cast Iron Plug Valves, Flanged and Threaded Ends.
- BX. MSS SP-80 Bronze Gate, Globe, Angle and Check Valves.
- BY. MSS SP-110 Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- BZ. NSF 61 Drinking Water System Components Health Effects.
- CA. NSF 372 Drinking Water System Components Lead Content.
- CB. PPI TR-4 PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB), and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe.

1.03 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- B. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.06 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

- A. PVC Pipe: ASTM D2665.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Copper Pipe: ASTM B42, hard drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 - 1. PPI TR-4 Pressure Design Basis:
 - a. 100 psig at maximum 180 degrees F.
 - 2. Fittings: Brass and copper.

PLUMBING PIPING

3. Joints: Mechanical compression fittings.

2.05 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 - 1. PPI TR-4 Pressure Design Basis:
 - a. 100 psig at maximum 180 degrees F.
 - 2. Fittings: Brass and copper.
 - 3. Joints: Mechanical compression fittings.

2.06 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
 - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

2.07 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping Drain, Waste, and Vent:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- C. Plumbing Piping Water:
 - 1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

2.08 BALL VALVES

A. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

2.09 WATER PRESSURE REDUCING VALVES

- A. Up to 2 Inches:
 - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.

PLUMBING PIPING
2.10 RELIEF VALVES

- A. Temperature and Pressure:
 - 1. ANSI Z21.22, AGA certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labelled.

2.11 STRAINERS

- A. Size 2 inch and Under:
 - 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
 - 2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install water piping to ASME B31.9.
- G. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

PLUMBING PIPING

- H. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- I. Sleeve pipes passing through partitions, walls and floors.
- J. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Place hangers within 12 inches of each horizontal elbow.
 - 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 4. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

3.04 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install ball valves for throttling, bypass, or manual flow control services.

3.05 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.
 - b. Pipe Size: 1-1/2 inches to 2 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.
 - c. Pipe Size: 2-1/2 inches to 3 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 1/2 inch.
 - 2. Plastic Piping:
 - a. All Sizes:
 - 1) Maximum Hanger Spacing: 6 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION 22_1005

DIVISION 23 – HVAC

SECTION 23_0500 - BASIC MECHANICAL MATERIALS AND METHODS PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Mechanical Basic Requirements specifically applicable to Divisions 21, 22, and 23 in addition to the requirements of Division 1 General Requirements and the General Conditions of the Contract.
 - 2. Electric motors.
 - 3. Mechanical Identification.
 - 4. Sleeves
 - 5. Mechanical sleeve seals.
 - 6. Altitude rating.

1.02 RELATED SECTIONS

- A. Work described in this section is related to other work described in Divisions 21, 22, 23, 27, and 28 and may be related to work in other Divisions concerning structure or appearances. Review and become familiar with work required in other Sections in this Division and with work required in the other Divisions. Coordinate with other subcontractor(s) to assure that all issues arising between related Sections are resolved.
- B. Bring to the attention of the Engineer prior to the cutoff date for Addenda, any and all discrepancies in related work. Submission of a bid or proposal indicates that all costs for this work and related work are included in the bid for this work or within the bid or proposal for the related work.

1.03 SYSTEM DESCRIPTION

A. Provide complete and fully operational systems with facilities and services to meet requirements indicated and in accordance with applicable codes and ordinances.

1.04 REGULATORY REQUIREMENTS

- A. All mechanical work shall be performed in strict accordance with the New Mexico Building Codes, IBC, UPC, UMC, NFPA, National Gas Code, Model Energy Code, and all applicable provisions of the local authorities having jurisdiction. All materials and labor necessary to comply with rules, regulations, and ordinances shall be provided. Where the drawings and/or specifications indicate material or construction in excess of code requirements or visa-versa, the more stringent application shall govern.
- B. Permits necessary for the performance of the work under this contract shall be secured and paid for by the Contractor. Final inspection by the Engineer will not be made, or certificate of final payment issued, until certificates of satisfactory inspection from the inspection authorities are delivered.

1.05 SUBMITTALS

A. Submit all data as a single package, as the Engineer will commence review only when all data has been received.

BASIC MECHANICAL MATERIALS AND METHODS

- B. Submittal form to identify project, contractor, sub-contractor, supplier, and pertinent contract document references.
- C. Apply Contractor's stamp, signed or initialed, certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and contract documents.
- D. The Contractor shall determine and verify field measurements and field construction criteria for conformance with drawings and specifications and for conflicts with other items of construction, past or present. He shall coordinate each submittal with the requirements of the work and of the contract documents and notify the Engineer in writing, at the time of the submission, of any and all deviations in the submittals from requirements of the work and contract documents.
 - 1. No fabrication or work, which requires submittals, shall begin until submittals are returned with the Engineer's approval.
- E. Identify variations for contract documents and product or system limitations, which may be detrimental to successful performance of the completed work.
- F. Engineer's review does not constitute acceptance or responsibility for accuracy or dimensions, nor shall it relieve the Contractor from meeting any requirements of the work and contract documents, nor shall it constitute approval for any deviation from the contract documents, unless such deviations are specifically stated as such on the submittal and specifically allowed by the Engineer by specific written notification for each such variation. The Engineer's review will not relieve the Contractor from responsibility for errors or omissions in the shop drawings.
- G. Revise and resubmit submittals as required. Identify all changes made since previous submittal.
- H. The Engineer will review a submittal and, if necessary, a resubmittal of the same item. Subsequent resubmittals shall be accompanied by Contractor's purchase order to Engineer for Engineer's review time and costs at Engineer's standard hourly billing rates. These reviews will be performed at the convenience of the Engineer.
- I. Provide eight (8) copies of materials for submittal review. If Contractor intends to utilize electronic submittals, one (1) hard copy must still be delivered to Engineer, hard copy will be dated when received and will be the official copy. Engineer will return submittal electronically.

1.06 SUBSTITUTIONS

- A. Prior approval of materials and equipment will not be considered. Contract documents indicate specified equipment and acceptable alternatives. Any other equipment/material proposed must meet or exceed that specified. Equipment/material will be reviewed for compliance during submittal review process per Paragraph 1.5.
- B. Engineer will consider requests for substitutions only at submittal review. Clearly identify substitution.
- C. Document each request with complete data substantiating compliance of proposed substitution with contract documents.
- D. A request for substitution constitutes a representation that the Contractor:

BASIC MECHANICAL MATERIALS AND METHODS

- 1. Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product.
- 2. Will provide the same warranty for the substitution as for the specified product.
- 3. Will coordinate installation and make changes to other work, which may be required for the work to be complete with no additional cost to Owner.
- 4. Waives claims for additional costs or time extensions which may, subsequently, become apparent.
- 5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with reapproval by authorities.

1.07 OPERATIONS AND MAINTENANCE DATA

- A. Submit three (3) sets prior to final inspection, in 8-1/2" x 11" text pages, bound in three (3) D-side ring binders with durable plastic covers. Provide one (1) set of original O&M Materials to Project Commissioning Authority no later than 30 days after submittals are approved. O&M package shall not be bound.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.
- C. Internally sub-divide the binder contents with permanent page dividers, logically organized with tab titling clearly printed under reinforced, laminated plastic tabs.

D. Contents:

- 1. Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Sub-contractors, and major equipment suppliers.
- 2. Operation and maintenance instructions arranged by system.
- 3. Project documents and certificates.

1.08 DELIVERY, STORAGE, AND HANDLING

A. In accordance with the requirements of Division 1.

1.09 RECORD AS-BUILT DRAWINGS

- A. Maintain on site one set of record documents exclusively for the purpose of Record As-Built Drawings.
- B. Record into Record Drawings, Project Manual and Product Data, the actual "as-built" Work including all revisions. Include actual location of all work.
- C. Record information concurrent with the construction progress.
- D. Ensure entries are complete and accurate, enabling future references by Owner.
- E. Modify reproducible drawings and two (2) sets of the project manual, delineating recorded as-built conditions of the project or Record Documents compiled from the job records. The Contractor may obtain reproducible drawings from the office of the Architect or Engineer.

- F. Provide electronic (.DWG or .PDF) files of "as-built" conditions. Contractor may obtain electronic drawings from the office of the Architect or Engineer and must modify the electronic record documents. The Contractor shall submit the as-built drawings in electronic format and printed drawings on the medium specified. The Contractor may request Engineer to complete modifications to drawings. Such request must be accompanied by Contractor's purchase order to Engineer for drafting services.
- G. Completion of Record As-Built Drawings is a condition of final inspection and consideration of final payment.

1.10 CLOSEOUT PROCEDURES

- A. See Division 1 for additional closeout procedures.
- B. See Paragraph 3.7 for Substantial Completion and Final Inspection Requirements.

1.11 FINAL INSPECTIONS

A. One final inspection for completion of project will be performed by the Engineer. Any and all additional inspections requested by the Contractor or required because of Contractor's failure to complete scope of work, shall be paid for by the Contractor. Costs for additional inspections shall be assessed at the Engineer's hourly rates.

PART 2 PRODUCTS

2.01 ELECTRIC MOTORS

- A. Motors shall be of sufficient size for the duty to be performed and shall not exceed their full-rated load when the driven equipment is operating at specified capacity under the most severe conditions likely to be encountered.
- B. Each motor shall be of the horsepower specified and suitable for operation at the elevation of the job site as scheduled on the drawings.
- C. Motors shall conform to NEMA standards, applicable to IEEE Standards and ASA C50 Standards, and shall be suitable for direct coupling mounting or V-belt mounting in accordance with the drawings.
- D. Motors controlled by variable frequency drives/adjustable frequency drives, "VFD/AFD", shall be rated for use on "VFD/AFD" controllers.

2.02 MECHANICAL IDENTIFICATION

- A. Equipment Nameplates: Laminated three-layer plastic with engraved black letters on light background color.
- B. Valve Tags: Laminated three-layer plastic with engraved black letters on light background color, minimum 1-1/2 inches diameter.

C. Piping:

- 1. Conform to ASME A13.1.
- 2. Minimum information indicating flow direction arrow and identification of fluid being conveyed.
- 3. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
- 4. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- 5. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.03 SLEEVES

- A. Sleeves for pipes through non-fire rated floors: 18 gage thick galvanized steel.
- B. Sleeves for pipes through non-fire rated beams, walls, footings, and potentially wet floors: steel pipe or 18 gage thick galvanized steel.
- C. Sleeves for round ductwork: galvanized steel.
- D. Sleeves for rectangular ductwork: galvanized steel or wood.
- E. Sealant: acrylic

2.04 MECHANICAL SLEEVE SEALS

A. Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.05 ALTITUDE RATINGS

A. Unless otherwise noted, all specified equipment capacities, air quantities, etc., are for the altitude of the job site, as scheduled on the drawings, and adjustments to manufacturer's ratings must be made accordingly.

PART 3 EXECUTION

3.01 INSTALLATION - IDENTIFICATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Degrease and clean surfaces to receive adhesive for identification materials.
- C. Install plastic nameplates with adhesive.
- D. Install plastic tags with corrosion-resistant metal chain.

- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Label piping at all changes in direction and at a minimum of every 20 feet of straight runs of pipe.
- G. Record actual location of valves on Project Record Documents.

3.02 INSTALLATION - CONDENSATE AND OVERFLOW DRAINS

A. Install condensate and overflow drain piping from all mechanical equipment drain points. Extend and terminate per UPC/UMC.

3.03 INSTALLATION - SLEEVES

- A. Verify openings are ready to receive sleeves.
- B. Exterior watertight entries: Seal with mechanical sleeve seals.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install chrome plated steel or, if allowed by the authority having jurisdiction, plastic escutcheons at finished surfaces.

3.04 EXISTING SERVICES

- A. The Contractor shall carefully examine the drawings and specifications, visit the site of the work, be fully informed as to all existing conditions, dimensions, and limitations before starting work.
- B. If existing active or non-active services, which are not shown on plans, are encountered which require relocation or disconnection, the Contractor shall notify the Engineer for a decision on proper handling of these services. The Contractor shall not proceed with the work until so authorized.

3.05 EXCAVATION AND BACKFILL OF TRENCHES

A. All excavation, trenching, and backfilling, as required for the mechanical installation, shall be provided by the Contractor.

- B. All piping laid in trenches shall be bedded evenly and firmly. The trench bed shall consist of undisturbed native soil or shall be compacted to an equally firm bedding. Recesses shall be formed below the trench bed to receive the flange or hub off each section of pipe or fitting.
- C. Where firm bedding is not obtainable, sand or gravel fill, compacted with water or low strength concrete fill around the bottom half of the pipe, shall be used.
- D. Backfill all trenches as soon as possible after inspection. Spread backfill in layers, not to exceed 8 inches, and compact each layer to ninety-five percent (95%) of maximum density based on Modified Proctor Density, in such areas as streets, driveways, alleys, or walks to prevent settling. Backfill shall be neither excessively wet or dry. Puddling or flooding shall not be used, except in sand or gravel-bearing soil, and as specifically approved. Street cuts shall be made 8 inches wider than required trenches and shall be repaired to match the finish surface of the street and be flush with existing grades.
- E. Use plastic underground pipe markers for all buried piping.

3.06 PAINTING

- A. Surfaces of all equipment and material shall be thoroughly cleaned and left ready for painting.
- B. Painting shall be performed by others, unless otherwise specified in the contract documents.

3.07 ELECTRICAL WIRING AND CONTROL EQUIPMENT

- A. All motor starters, disconnects overload protection equipment, and low voltage control equipment and wiring specified under this Division will be the responsibility of this Contractor. Installation of line voltage components and wiring specified under this Division will be the responsibility of the electrical contractor. Purchase and installation of low voltage components and wiring specified under this Division will be this Contractor's responsibility.
- B. The mechanical contractor must coordinate with the electrical contractor on the division of responsibility pertaining to the purchase and installation of electrical control components. Any changes or additions required due to the specific nature of equipment furnished shall be the complete responsibility of the Contractor furnishing the equipment.
- C. All electrical work performed under this Division will be in compliance with the NEC and all applicable city and state ordinances. All controllers furnished with mechanical equipment shall have overload protection on all phases.
- D. The mechanical contractor must coordinate with the electrical contractor to ensure that all required components of control work are included and fully understood. No additional costs shall accrue to the Owner as a result of lack of such coordination.

3.08 SUBSTANTIAL COMPLETION AND FINAL INSPECTION REQUIREMENTS

- A. Before substantial completion can be granted, the following items must be completed and submitted to the Owner/Engineer:
 - 1. An approved Test and Balance Report.
 - 2. Operation test demonstrating proper operation of all equipment.

BASIC MECHANICAL MATERIALS AND METHODS

- 3. Control diagrams, wiring diagrams, control sequences, and engineering data on components.
- B. Prior to the final inspection or consideration of final payment, the Contractor shall:
 - 1. Provide copies of permits, operating permits, and/or inspection certificates.
 - 2. Provide a check-out report.
- C. Provide operating and maintenance manual(s).
 - 1. Provide record as-built drawings.
 - 2. Return keys to the Owner.
 - 3. Deliver all spare parts.
 - 4. Touch up any damaged finishes.
 - 5. Provide a copy of attendance roster for equipment training sessions.
 - 6. Provide all warrantee certificates and documentation.

END OF SECTION 23_0500

SECTION 23_0700 - MECHANICAL INSULATION

PART 1 GENERAL

1.01 GENERAL

- A. This specification section defines the minimum quality, labor and supervision, tools and equipment, methods and procedures, materials, and assemblies for furnishing, fabricating, assembling, and installing complete permanently-installed, commercial insulation systems as shown on the drawings, design data sheets, lists and schedules, and other instructions included in these technical specifications.
- B. Modifications, alterations, exceptions, or additions to these specifications shall be as detailed on the mechanical drawing(s), in special instructions, or published in numbered addenda described in these specifications. Changes to the work shall be made only by change order procedure as described in these specifications.
- C. By submission of bid, Contractor assures the Owner/Engineer that he/she fully understands the work and has included all items and costs for a complete system as described above.
- D. All mechanical equipment, ductwork, and piping to be insulated per the 2015 IECC.

1.02 REFERENCE STANDARDS

- A. Insulation systems, repairs, additions, and alterations, as individually specified, shall be furnished and installed in accordance with industry standards and all statutory provisions as apply to the work.
- B. Contractor shall conform to OSHA and other published practices for installation of mechanical insulation systems.
- C. ASTM C 518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- D. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E 96/E 96M Standard Test Methods for Water Vapor Transmission of Materials.
- F. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc..

1.03 DESIGN CRITERIA

A. The Contractor shall review and consider the project design criteria in the selection of materials and accessories in the insulation system.

1.04 **DEFINITIONS**

A. Insulation terminology within this specification shall be that included in the "Glossary" of MICA.

1.05 CLARITY OF INFORMATION

A. It shall be noted that the drawings, specifications, and standards are complementary to each other, meaning that what is called for in one is called for in all. Where conflicts occur between drawings, specifications, and standards, specifications shall govern.

1.06 SCOPE OF WORK

A. Installation shall mean, but is not limited to, purchasing, receiving, transporting, storing, fabricating, applying, inspecting, and proving complete insulation systems in accordance with MICA national standards, addenda, and those technical specifications for the individual insulation systems under the contract.

1.07 EQUIPMENT

A. Contractor shall provide all tools, ladders, staging, platforms, scaffolding, and other devices required for a complete installation of the complete insulation systems, and shall maintain these items in a safe and operating condition.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of twenty-four (24) hours. Monitoring will be required at intervals and tolerances recommended by manufacturer. Materials exposed to conditions outside manufacturer's recommendations will be subject to reinstallation.

1.09 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience, approved by manufacturer.

PART 2 PRODUCTS

2.01 GENERAL

A. Materials furnished under this specification shall be standard, cataloged products, new and commercially available, suitable for service, requiring high performance and reliability with low maintenance, and free of all defects.

- B. Materials include, but are not limited to, insulation materials, accessories (staples, bands, mesh, wire, clips, pins, tape, anchors, corner angles, and similar recommended accessories), and compounds (cements, adhesives, coatings, sealers, protective finishes, and similar other recommended items for the systems).
- C. All adhesives, sealants and sealant primers VOC limits shall comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168.
- D. The Contractor, unless clearly stated otherwise, shall supply materials, which meet the Engineer's requirements with respect to the design criteria, thermal conductivity, and standards.
- E. The Contractor shall warrant the materials in accordance with these specifications.
- F. Specified components of the insulation system, including accessories and compounds as listed above, shall have a fire hazard rating not to exceed:
 - 1. Flame spread:25
 - 2. Smoke developed:50
- G. All accessories and materials are to be shipped to the job site in marked, unopened containers as received from the manufacturer.

PART 3 EXECUTION

3.01 GENERAL

- A. All insulation work shall be performed by skilled mechanics regularly engaged in the insulation trade.
- B. The Contractor shall be responsible for coordination and cooperation with the Owner/Engineer and all other trades, so that the installation is performed with minimum interference and conflict. Verify that ductwork has been tested before applying insulation materials.
- C. Final appearance: Neat, workmanlike, and attractive.
- D. Progressive testing: Shall be completed and approved by Engineer or designate before insulation is applied.
- E. Cleaning: Prior to applications of insulation, all surfaces shall be cleaned, dry, and free of dust, dirt, grease, frost, moisture, and other imperfections.
- F. Applications temperature and conditions: Contractor shall assure that all conditions are met for the application of the insulation systems and that the recommended durations are met.
- G. Moisture protection: All insulation shall be protected from moisture and weather during storage, installation, and until Owner/Engineer has taken beneficial occupancy of facility. Applied insulation which has become wet, shall be thoroughly dried before sealing or jacketing is applied.

- H. Protection from damage: Insulation, fabric, jacketing, and all accessories and compounds shall be protected from damage by the Contractor. All damage shall be repaired prior to the final inspections of the project.
- I. Storage: Contractor is responsible for proper material storage at site.
- J. Work starting: No work shall commence until Contractor has received approved submittals for all insulation systems required in the project.
- K. Clearances and accesses: The installation of insulation systems shall, in no way, reduce or interfere with the access and adequate clearances for control mechanisms, dampers, sleeves, columns, walls, vibrations isolation, flexibility components, and other job features. Maintain service clearances to strainers so that drain port is clear of all obstructions.
- L. Finishing: All insulation at handholes, access doors, or other openings and adjacent to flanges and valves shall be neatly finished where exposed to view.
- M. Sleeves: Where insulated pipes or ducts pass through sleeves or openings, the full specified thickness of insulation shall pass through the sleeve or openings.
- N. Vapor barriers: Vapor barriers shall be continuous through sleeves, hangers, etc. If pierced, vapor barriers shall be covered and suitably resealed.
- O. Provide aluminum jacket on all exterior piping per jacket manufacturers recommendations.

3.02 OWNER/ENGINEER ACCEPTANCE

A. All materials, accessories, compounds, and methods of installation and fabrication are subject to the Owner's/Engineer's inspections and approval at any phase of the work.

END OF SECTION 23_0700

SECTION 23_2113 - HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Radiant heating piping system.
- C. Pipe hangers and supports.
- D. Unions, flanges, mechanical couplings, and dielectric connections.
- E. Valves:
 - 1. Ball valves.
 - 2. Check valves.
 - 3. Pressure independent temperature control valves and balancing valves.
- F. Flow controls.

1.02 REFERENCE STANDARDS

- A. ASME BPVC-IX Boiler and Pressure Vessel Code, Section IX Welding, Brazing, and Fusing Qualifications.
- B. ASME B16.3 Malleable Iron Threaded Fittings: Classes 150 and 300.
- C. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings.
- D. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
- E. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- F. ASTM A106/A106M Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
- G. ASTM B32 Standard Specification for Solder Metal.
- H. ASTM B88 Standard Specification for Seamless Copper Water Tube.
- I. ASTM B88M Standard Specification for Seamless Copper Water Tube (Metric).

- J. ASTM D1785 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- K. ASTM D2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- L. ASTM D2466 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- M. ASTM D2467 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- N. ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
- O. ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.
- P. ASTM F1476 Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
- Q. AWS A5.8M/A5.8 Specification for Filler Metals for Brazing and Braze Welding.
- R. AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings.
- S. AWWA C151/A21.51 Ductile-Iron Pipe, Centrifugally Cast.

1.03 SUBMITTALS

A. Product Data:
1. Include data on pipe materials, pipe fittings, valves, and accessories.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with documented experience.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:

- 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
- 2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
- 3. Grooved mechanical joints may be used in accessible locations only.
 - a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect.
 - b. Use rigid joints unless otherwise indicated.
- 4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D. Valves: Provide valves where indicated:
 - 1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
 - 2. For shut-off and to isolate parts of systems or vertical risers, use ball valves.

2.02 RADIANT HEATING PIPING

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) annealed.
 - 1. Fittings: ASME B16.22, wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP copper/silver alloy.
- B. Polyethylene Pipe: ASTM F876 or ASTM F877, cross-linked polyethylene, 100 psig operating pressure at 180 degrees F.
 - 1. Fittings: Brass and copper.
 - 2. Joints: Mechanical compression fittings.

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
 - 3. Vertical Support: Steel riser clamp.
 - 4. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
 - 5. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Less:
- B. Flanges for Pipe 2 Inches and Greater:
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.

- 1. Dimensions and Testing: In accordance with AWWA C606.
- 2. Mechanical Couplings: Comply with ASTM F1476.
- 3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
- 4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

2.05 BALL VALVES

- A. Up To and Including 2 Inches:
 - 1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

2.06 SWING CHECK VALVES

A. Up To and Including 2 Inches:
1. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder ends.

2.07 SPRING LOADED CHECK VALVES

A. Iron body, bronze trim, split plate, hinged with stainless steel spring, resilient seal bonded to body, wafer or threaded lug ends.

2.08 PRESSURE INDEPENDENT TEMPERATURE CONTROL VALVES AND BALANCING VALVES

- A. Control Valves: Factory-fabricated pressure independent with internal differential pressure regulator (DPRV) which automatically adjusts to normal changes in system pressure and provides 100 percent control valve authority at all positions of the valve.
 - 1. Maintain proportional and linear flow coil characteristics.
 - 2. PICV to accurately control the flow from 0 to 100 percent full rated flow with an operating pressure differential range of 3 to 60 psig.
- B. Electronic Actuators: Direct-mounted, self-calibrating type designed for minimum 60,000 full-stroke cycles at rated force.

2.09 FLOW CONTROLS

- A. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- B. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

- B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment using jointing system specified.
- E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- F. After completion, fill, clean, and treat systems. Refer to Section 23 2500 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and to avoid interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Slope piping and arrange to drain at low points.
- F. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
- G. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Provide access where valves and fittings are not exposed.
- I. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
 - 1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 - 3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.

- B. Hanger Spacing for Plastic Piping.
 - 1. 1/2 inch: Maximum span, 42 inches; minimum rod size, 1/4 inch.
 - 2. 3/4 inch: Maximum span, 45 inches; minimum rod size, 1/4 inch.
 - 3. 1 inch: Maximum span, 51 inches; minimum rod size, 1/4 inch.
 - 4. 1-1/4 inches: Maximum span, 57 inches; minimum rod size, 3/8 inch.
 - 5. 1-1/2 inches: Maximum span, 63 inches; minimum rod size, 3/8 inch.
 - 6. 2 inches: Maximum span, 69 inches; minimum rod size, 3/8 inch.

END OF SECTION 23_2113

SECTION 23_8300 ROOF ICE MELT SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section includes but is not limited to furnishing and installing a complete roof de-icing system of engineered extruded base panels, cover panels, UL Listed heater cables, connection kits and electronic controllers.

1.02. RELATED REQUIREMENTS

A. Section 07 2000 - Thermal Protection

B. Section 07 7253 - Snow Guards

C. Section 07 4113 - Roofing Panels

D. Section 07 5000 - Membrane Roofing

E. Section 07 6200 - Flashing and Sheet Metal

F. Section 26 00 00 - Electrical

1.03 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Conduct a pre-installation meeting <<one week; at least one week; _____; or None - N/A>> prior to the start of the work in this section; require attendance by all affected installers.

B. Sequencing: Ensure that the electrical testing and connections be coordinated with the roof installation in an orderly and expeditious manner.

1.2 SYSTEM DESCRIPTION

A. The system shall consist of all equipment and materials for a complete roof de-icing system installation specifically designed for keeping water paths clear and to avoid ice dams on roof eaves, gutters, and downspouts, with ambient temperature sensing controllers, integrated ground-fault circuit protection, and Building Management System (BMS) communication capabilities.

B. See Manufacturer's current Installation and Operations Guide and System Layout for

detailed information.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures

B. Product Data: Submit Manufacturer's Data Sheets for all eave, valley, gutter, and controller components

C. Shop Drawings: Submit drawings and System Layout showing the following:

- 1. Determine the zones for system.
- 2. Locations of controllers.
- 3. Eave panel layout.
- 4. Valley panel layout.

5. System Layout with sensors, junction box, and controller probe locations.

6. Distribution panel location and drawings.

D. Installation Guide: Submit Manufacturer's written Installation and Operation Guide for system.

E. Field Quality Control Submittals: Complete testing and record readings in Installation Log.

F. Project Field Documents: Record actual installations of junction boxes, branch circuits with cable meter (footage) readings (start and end counts)

G. Operation and Maintenance Data: Include Manufacturer's descriptive literature, operating instructions of system and controls, installation instructions, maintenance and repair data, and parts listings.

H. Warranty: Submit Installation Log demonstrating satisfactory testing results to Manufacturer, Project Architect, General Contractor, and Owner. Submit copy of Manufacturer's standard warranty for system.

I. Maintenance Data:

1. Include repair methods and parts list of components

2. See Section 01 6000 - Product Requirements for additional provisions.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Company specializing in roof ice melt systems specified in this section, with not less than Five (5) years of experience in high-efficiency systems.

B. Installer qualifications: System installer shall have a complete understanding of product and product literature from manufacturer prior to installation. Electrical connections and testing shall be conducted by a licensed electrician.

C. Regulatory Requirements and Approvals: Systems heating cable and connection kits to be Listed and Classified by UL (Underwriter's Laboratories) for roof and gutter deicing.

D. Copies of Documents at Project Site: Maintain at the Project Site a copy of each referenced document that prescribes execution requirements, including Installation Log with recorded readings to date.

1.06 STORAGE AND HANDLING

A. Deliver, store, and handle to prevent deterioration due to moisture, temperature changes, or other causes.

B. Delivery and Acceptance Requirements: Deliver products to site in original, unopened containers or packages with legible and intact manufacturer's labels identifying the following:

- 1. Product and Manufacturer
- 2. Length/Quantity
- 3. Lot Number
- 4. Installation and Operation Guide
- C. Storage and Handling Requirements

1. Store the materials in clean, dry indoor location off the ground with a temperature range of 0° F. and 100° F.

2. Protect the heating cable from mechanical damage.

3. Do not allow components with strippable film to be exposed to sunlight or excessive heat before installation.

1.07 WARRANTY

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

B. Provide warranty as follows:

1. 50-year warranty on Panel Covers

2. 50-year warranty on aluminum Base Panels

3. 40-year warranty on Kynar-500 finished Panel Covers

4. <<2-year; 10-year; 20-year; or ____>>>manufacturer's warranty for heating cable system>>.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Manufacturer:

1. Manufacturer shall have no less than five years' experience with manufacturing of roof ice melt systems.

2. Manufacturer must manufacture component to ISO 9000 requirements, and all sheet metal products must be manufactured in-house to 0.25 angle and 0.004" dimensional tolerances.

3. Acceptable Manufacturer: Summit Ice Melt Systems, Inc. summiticemelt.com

4. Substitutions: Not Permitted

2.2 PRODUCTS, GENERAL

A. Single-Source Responsibility: Furnish complete heat tracing system for roof and gutter de-icing from single manufacturer.

B. All components shall be made in the United States of America, including cable, aluminum extrusions and covers, and controllers.

C. The complete system (heating cable, metal panels, connection kits, and controllers) shall be for roof and gutter de-icing. No parts of the system may be substituted or exchanged.

2.3. PRODUCT SELECTION

A. Determine the roof edge ice melt system Product Line with Snow Classification Map :

1. Radiant Edge PROTM [Class 1 (Heavy) and 2 (Moderate) snow areas] with full Class 1 performance using 24 watts per lineal foot of eave.

2. Radiant Edge LTTM [Class 2 (Moderate) and 3 (Light) snow areas] with full Class 2 performance using 12 watts per lineal foot of eave extrusion. (No sheet metal only cable covers permitted)

3. Radiant Edge HotSlot[™] [for Class 2 (Moderate) and 3 (Light) snow areas] with Class 3 performance using 12 watts per lineal foot of eave (No sheet metal only cable covers permitted)

4. Radiant Edge Valley[™] [All areas]

5. Radiant Edge Lowslope[™] [All areas: for low pitch and metal roofs] for all areas with slopes as low as 1/8" per 12" run, using 24 watts per lineal foot of eave

6. Heated Standing Seam [All areas]

B. S1 (120Vac) or S2 (208-277Vac) Self-regulating heater cable for roof systems and gutters and downspouts.

1. UL and CSA approved self-regulating heater cable 12 watt per foot nominal output heater cable

2. Two Bus Wires: 16 AWG, Nickel Plated Maximum 5. Metallic Braid: 16 AWG (equivalent size) tinned copper

3. Heating Core: Radiation Cross-linked Polyolefin.

4. Primary Dielectric Insulation: Radiation Cross-linked Polyolefin

5. Metallic Braid: 16 AWG (equivalent size) tinned copper

6. Outer Jacket: Polyolefin

7. Minimum Bend Radius: 1.125"

8. The outer jacket of heating cable shall have the following markings:

a. Heating cable Model Number

- b. Agency Listings
- c. Meter Mark
- d. Lot/Batch ID

9. Supply Voltage: <<S1: 120Vac; S2: 208Vac; S2: 240Vac; S2: 277Vac>>

C. Listings

1. Manufacturer shall provide UL and CSA certificates for roof and gutter deicing applications.

D. Assembly

1. Factory designed for outdoor applications

2. Provide Manufacturer's S1 (120Vac) or S2 (208-277Vac) self-regulating heater cable with 12 watts per foot nominal output.

3. Provide all manufacturer's accessories as required: power connection kits, splice kits, protective gutter and downspout straps.

E. Controls

1. Provide fully automatic microprocessor based control system

2. Sensing to be based upon Ambient Temperature Sensing Probe and / or Moisture Sensing Input

- 3. Field adjustable set point for system trigger and low-temperature shutoff
- 4. Controls to be
 - a. Local Zone CDC Contactor Controller (Smaller projects)

i. Supply ambient temperature sensing controller with field adjustable startup and low-temperature cutout settings, and Manual, Automatic, and Off toggle switching.

ii. Digital controller interface displaying status, ambient temperature, and mode

iii. Model 4CDC (with 4 - 30A Circuits) or 8CDC (with 8 - 30A circuits)

iv. Enclosure <<NEMA 1 enclosure for interior installations; NEMA 4 enclosure for exterior installations>>.

v. Size up to a larger controller as needed

b. High-Efficiency (HECS) Central Distribution and Control Panel

i. Contains multiple branch circuits and integrated protective breakers as required.

ii. Digital controller interface displaying status, ambient temperature, and mode. Ambient temperature sensing controller sensing multiple zones.

iii. Enclosure <<NEMA 1 enclosure for interior installations; NEMA 4 enclosure for exterior installations>>.

iv. Multiple branch circuits and integrated breakers as needed

v. Field adjustable set point for system trigger and low-temperature shutoff

c. Ultra-High Efficiency Controller (MCCPR) Central Distribution Control Panel

i. Contains multiple branch circuits and integrated protective breakers as required.

ii. Digital controller interface displaying status, ambient temperature, and mode. Ambient temperature and moisture sensing controller sensing multiple zones.

iii. Enclosure <<NEMA 1 enclosure for interior installations; NEMA 4 enclosure for exterior installations>>.

iv. Multiple branch circuits and integrated breakers as needed

v. Field adjustable set point for system trigger and low-temperature shutoff

vi. Interface to connect to a Building Management System (BMS) as needed.

F. Accessories

1. Provide manufacturer's stainless steel protective downspout straps with UV resistant zip ties.

G. Electrical Characteristics

1. Radiant Edge PROTM (24 watts/foot) Note: 12 watt or 36 watt per foot systems are not acceptable.

- 2. Radiant Edge LTTM (12 watts/foot)
- 3. Radiant Edge HotSlot[™] (12 watts/foot)
- 4. Radiant Edge Valley™ (24 watts/foot)
- 5. Radiant Edge Lowslope™ (24 watts/foot)
- 6. Radiant Edge Heated Standing Seam (to be determined)
- 7. S1 (120Vac) and S2 (208-277Vac) 12 watt per foot nominal output heater cable
- H. Metals/Finishes

1. Aluminum Panel Covers: Select from Manufacturer's .040" thick (18 ga.) aluminum with Kynar-500 paint finish from manufacturer's standard color selection. Color to be . Shall have strippable film cover to protect painted finishes and removed at installation.

- 2. Real Copper
 - i. Copper shall be 20 oz. per foot (nominal 0.027" thick)

ii. Copper shall have thermally transparent polyvinyl isolator film on the side that is in contact with the aluminum Base Panels. This must be used to protect copper covers from galvanic corrosion (electrolysis) from contact with dissimilar metals (aluminum Base Panels)

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine roofing and/or roof deck for proper installation, cleanliness, or condition that may hinder proper installation of ice melt system.

- 1. Notify Contractor in writing of items needing correction.
- 2. Do not install ice melt system until faulty conditions are corrected.

3.2 INSTALLERS

A. Licensed Contractor with a minimum of two years successful certified experience installing projects utilizing roof edge ice melt systems equal to systems specified in this section.

3.3 INSTALLATION

A. Interface with Other Work: Coordinate installation of ice melt system with appropriate sections in Division 07 for roofing material and appropriate sections of Division 26 Electrical.

B. Verify heater voltage matches System Layout and project's voltage requirements. Perform testing of heater cable and record megohimmeter testing results in Installation Log per section 3.3.

C. Comply with the manufacturer's recommendations in the S1 and S2 heating cable, connection kits and splice kits Installation and Operation Guide and manuals.

D. Install ice melt system, including Eave and Valley Base Panels, and self-regulating heater cables per the drawings and Manufacturer's Installation and Operation Guide. Prior to installation of cover panels, perform and record megohimmeter testing results in manufacturer's log form in the Installation and Operation Guide. Make any necessary corrections before proceeding with the installation. Have Project Supervisor approve compare to System Layout and approve cable installation.

E. On new construction, apply a strip of waterproof membrane along the top edge of the eave cover panels to ensure weather tight installation. Locate strip low enough to weatherproof adjacent roofing fasteners, and high enough to not be visible when roofing is installed.

F. Ensure all circuits are protected with 30mA GFCI breakers as required by NEC.

3.3 FIELD QUALITY CONTROL

A. Heater cable handling and testing as directed by System Manufacturer in Installation Guide:

1. Heater cable testing and the recording of the results in Installation Log is required at three phases

- a. At time of materials delivery
- b. After cable is installed in system but prior to covering with Cover Panels
- c. Before commissioning and powering up system.

d. Do not proceed with project if unsatisfactory test results are given. Follow the procedures in the Troubleshooting section of Installation and Operation Guide until requirements are met.

e. Provide the completed Installation Log to the Owner/Contractor and to Summit Ice Melt Systems within 30 days of completion.

2. Heater Cable Testing Criteria

a. The heater cable must be tested at 500Vac and 100Vac megohmmeter.

b. Minimum acceptable insulation resistance readings shall be 20 megaohms or greater.

- 3. Heater Cable Handling
 - a. Do not pull cable over sharp edges.
 - b. Do not use excessive pulling force.
 - c. Do not kink or crush the heating cable.

ROOF ICE MELT SYSTEMS

d. Do not walk on heater cable.

e. Protect heater cable from sharp edges, such as sheet metal covers, with electrical tape.

B. Install per Manufacturer's most recent edition of the Installation and Operation Guide and follow System Layout specific to this project. In no case exceed the maximum cable length allowed per circuit as found in the specifications.

C. Ensure that only Manufacturer's components are use on project.

D. Ensure that all circuits are protected with 30mA ground-fault equipment protection device GFEPDs.

E. Ensure all work is performed in accordance with the National Electrical Code (NEC), agency certifications, and national and local laws.

3.4 DEMONSTRATION

A. Test system and operate in presence of Architect, Contractor, and Owner's Representative to be certain system functions in accordance with design intent.

B. Provide adequate demonstration and training to Owner in operation and maintenance of system.

END OF SECTION 23_8300

DIVISION 26 – ELECTRICAL

SECTION 26_0500 - BASIC ELECTRICAL MATERIALS AND METHODS

PART GENERAL

1.01 SUMMARY

- A. Section includes
 - 1. Electrical Basic Requirements specifically applicable to Division 26, 27, and 28 in addition to the requirements of Division 01 General Requirements and the General Conditions of the Contract.
 - 2. Grounding electrodes and conductors
 - 3. Bonding methods and materials
 - 4. Conduit and equipment supports
 - 5. Anchors and fasteners
 - 6. Nameplates and wire markers.

1.02 RELATED SECTIONS

- A. Work described in this section is related to other work described in Divisions 21, 22, 23, 26, 27, and 28 and may be related to work in other Divisions concerning structure or appearances. Review and become familiar with work required in other Sections in this Division and with work required in the other Divisions. Coordinate with other subcontractor(s) to assure that all issues arising between related Sections are resolved.
- B. Bring to the attention of the Engineer prior to the cutoff date for Addenda any and all discrepancies in related work. Submission of a bid or proposal indicates that all costs for this work and related work are included in the bid for this work or within the bid or proposal for the related work.

1.03 SYSTEM DESCRIPTION

- A. Grounding systems use metal frame of building and driven ground rod as grounding electrodes. Grounding system connections use mechanical fasteners.
- B. Select materials, sizes, and types of anchors, fasteners, and supports to carry loads of equipment and raceway, including weight of wire and cable in raceway. Anchor and fasten electrical products to building elements and finishes as follows:
 - 1. Concrete Structural Elements: Expansion anchors and preset inserts.
 - 2. Steel Structural Elements: Beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
 - 3. Concrete Surfaces: Self-drilling anchors and expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Toggle bolts and hollow wall fasteners.
 - 5. Solid Masonry Walls: Expansion anchors and preset inserts.
 - 6. Sheet Metal: Sheet metal screws.
 - 7. Wood Elements: Wood screws.
- C. Identify Electrical components as follows:
 - 1. Nameplate for each electrical distribution and control equipment enclosure.
 - 2. Wire marker for each conductor at panelboard gutters, pull boxes, and outlet and junction boxes.

1.04 REGULATORY REQUIREMENTS

- A. All electrical work shall be performed in strict accordance with the New Mexico Building codes, IBC, ANSI, NEC, NFPA, Model Energy Code, and all applicable provisions of the local authorities having jurisdiction. All materials and labor necessary to comply with rules, regulations, and ordinances shall be provided. Where the drawings and/or specifications indicate material or construction in excess of code requirements or visa-versa, the more stringent application shall govern.
- B. Permits necessary for the performance of the work under this contract shall be secured and paid for by the Contractor. Final inspection by the Engineer will not be made, or certificate of final payment issued, until certificates of satisfactory inspection from the inspection authorities are delivered.

1.05 SUBMITTALS

- A. Submit all data as a single package, as the Engineer will commence review only when all data has been received.
- B. Submittal form to identify project, contractor, sub-contractor, supplier, and pertinent contract document references.
- C. Apply Contractor's stamp, signed or initialed, certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and contract documents.
- D. The Contractor shall determine and verify field measurements and field construction criteria for conformance with drawings and specifications and for conflicts with other items of construction, past or present. He shall coordinate each submittal with the requirements of the work and of the contract documents and notify the Engineer in writing, at the time of the submission, of any and all deviations in the submittals from requirements of the work and contract documents.
 - 1. No fabrication or work, which requires submittals, shall begin until submittals are returned with the Engineer's approval.
- E. Identify variations for contract documents and product or system limitations, which may be detrimental to successful performance of the completed work.
- F. Engineer's review does not constitute acceptance or responsibility for accuracy or dimensions, nor shall it relieve the Contractor from meeting any requirements of the work and contract documents, nor shall it constitute approval for any deviation from the contract documents, unless such deviations are specifically stated as such on the submittal and specifically allowed by the Engineer by specific written notification for each such variation. The Engineer's review will not relieve the Contractor from responsibility for errors or omissions in the shop drawings.
- G. Revise and resubmit submittals as required. Identify all changes made since previous submittal.
- H. The Engineer will review a submittal and, if necessary, a resubmittal of the same item. Subsequent resubmittals shall be accompanied by Contractor's purchase order to Engineer for all Engineer's review time and costs at Engineer's standard hourly billing rates. These reviews will be performed at the convenience of the Engineer.

- I. See Division 01 for number of copies to be submitted.
- J. Product Data Basic Materials and Methods: Submit manufacturer's catalog data for grounding electrodes and connections; for fastening components; and nameplates, labels, and markers.

1.06 SUBSTITUTIONS

- A. Prior approval of materials and equipment will not be considered. Contract documents indicate specified equipment and acceptable alternatives. Any other equipment/material proposed must meet or exceed that specified. Equipment/material will be reviewed for compliance during submittal review process per Paragraph 1.5.
- B. Engineer will consider requests for substitutions only at submittal review. Clearly identify substitution.
- C. Document each request with complete data, substantiating compliance of proposed substitution with contract documents.
- D. A request for substitution constitutes a representation that the Contractor:
 - 1. Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other work, which may be required for the work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may, subsequently, become apparent.
 - 5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with reapproval by authorities.

1.07 PROJECT CONDITIONS

- A. Existing project conditions indicated on Drawings are based on casual field observation .
- B. Verify field measurements and circuiting arrangements are as shown on Drawings.
- C. Report discrepancies to Architect/Engineer before disturbing existing installation.

1.08 COORDINATION

- A. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other Sections to determine connection locations and requirements.
- B. Sequence rough-in of electrical connections to coordinate with installation and start-up of equipment furnished under other Sections.

1.09 OPERATIONS AND MAINTENANCE MANUALS

A. Submit three(3)sets prior to final inspection, bound in 8-1/2" x 11" text pages, three (3) D-side ring binders with durable plastic covers.

BASIC ELECTRICAL MATERIALS AND METHODS

- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.
- C. Internally sub-divide the binder contents with permanent page dividers, logically organized with tab titling clearly printed under reinforced, laminated plastic tabs.

D. Contents:

- 1. Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Sub-contractors, and major equipment suppliers.
- 2. Operation and maintenance instructions arranged by system.
- 3. Project documents and certificates.

1.10 DELIVERY, STORAGE, AND HANDLING

A. In accordance with the requirements of Division 1.

1.11 RECORD AS-BUILT DRAWINGS

- A. Maintain on site one set of record documents exclusively for the purpose of record as-built drawings.
- B. Record into Record Drawings, Project Manual and Product Data, the actual "as-built" Work including all revisions. Include actual location of all work.
- C. Record information concurrent with the construction progress .
- D. Ensure entries are complete and accurate, enabling future references by Owner.
- E. Modify reproducible drawings and two (2) sets of the project manual, delineating recorded as-built conditions of the project or record documents complied from the job records. The Contractor may obtain reproducible drawings from the office of the Architect or Engineer.
- F. Provide electronic (.DWG or .PDF) files of "as-built" conditions. Contractor may obtain electronic drawings from the office of the Architect or Engineer and must modify the electronic record documents. The Contractor shall submit the as-built drawings in electronic format and printed drawings on the medium specified. The Contractor may request Engineer to complete modifications to drawings. Such request must be accompanied by Contractor's purchase order to Engineer for drafting services.
- G. Completion of record as-built drawings is a condition of final inspection and consideration of final payment.

1.12 CLOSEOUT PROCEDURES

- A. See Division 1 for additional closeout procedures.
- B. See Paragraph 3.2 for Substantial Completion and Final Inspection Requirements.

1.13 FINAL INSPECTIONS

A. One final inspection for completion of project will be performed by the Engineer. Any and all additional inspections requested by the Contractor or required because of Contractor's failure to complete scope of work shall be paid for by the Contractor. Costs for additional inspections shall be assessed at the Engineer's hourly rates.

PART 2 PRODUCTS

2.01 ROD ELECTRODES

- A. Manufacturers:
 - 1. Thompson
 - 2. Harger
 - 3. NLP
 - 4. Or equal performance
- B. Product Description: Copper or copper-clad steel, 1/2 inch diameter rod electrode, 10 feet in length.

2.02 NAMEPLATES

- A. Product Description: Engraved three-layer laminated plastic nameplate, black letters on white background.
- B. Letter Size:
 - 1. 1/8 inch letters for identifying individual equipment and loads.
 - 2. 1/4 inch letters for identifying grouped equipment and loads.

2.03 WIRE MARKERS

A. Product Description: Cloth tape, split sleeve, or tubing type wire markers with circuit or control wire number permanently stamped or printed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install rod electrodes at locations indicated. Install additional rod electrodes as required to meet Regulatory Requirements.
- C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing where indicated. Bond steel together.
- D. Provide bonding to meet Regulatory Requirements.

BASIC ELECTRICAL MATERIALS AND METHODS

- E. Make electrical connections to utilization equipment in accordance with equipment manufacturer's instructions.
 - 1. Verify that wiring and outlet rough-in work is complete and that utilization equipment is ready for electrical connection, wiring, and energization.
 - 2. Make wiring connections in control panel or in wiring compartment of pre-wired equipment. Provide interconnecting wiring where indicated.
 - 3. Install and connect disconnect switches, controllers, control stations, and control devices as indicated.
 - 4. Make conduit connections to equipment, using flexible conduit. Use liquid-tight flexible conduit in damp or wet locations.
 - 5. Install pre-fabricated cord set where connection with attachment plug is indicated or specified, or use attachment plug with suitable strain-relief clamps.
 - 6. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.
- F. Install support systems sized and fastened to accommodate weight of equipment and conduit, including wiring, which they carry.
 - 1. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors.
 - 2. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
 - 3. Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.
 - 4. Do not use powder-actuated anchors.
 - 5. Do not drill structural steel members.
 - 6. Fabricate supports from structural steel or formed steel members.
 - 7. Install free-standing electrical equipment on concrete pads.
 - 8. Install surface-mounted cabinets and panelboards with minimum of four (4) anchors.
 - 9. Install steel channel supports to stand cabinets 1 inch off wall in wet locations.
 - 10. Install sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- G. Identify electrical distribution and control equipment and loads served to meet regulatory requirements.
 - 1. Degrease and clean surfaces to receive nameplates and tape labels.
 - 2. Install nameplate parallel to equipment lines. Secure nameplate to equipment front using screws or rivets. Secure nameplate to inside face of recessed pannelboard doors in finished locations.
- H. Install wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connections.
 - 1. Use branch circuit or feeder number to identify power and lighting circuits.
 - 2. Use control wire number as indicated on schematic and interconnection diagrams to identify control wiring.

3.02 SUBSTANTIAL COMPLETION AND FINAL INSPECTION REQUIREMENTS

- A. Before substantial completion can be granted, the following items must be completed and/or submitted to the Owner/Engineer.
 - 1. Test, adjust, and calibrate all systems.
 - 2. Provide typed panel directories installed in each panelboard.
 - 3. Label all electrical equipment properly.

BASIC ELECTRICAL MATERIALS AND METHODS
- B. Prior to the final inspection or consideration of final payment, the Contractor shall:
 - 1. Provide copies of permits and/or inspection certificates.
 - 2. Provide a check-out report.
 - 3. Provide Operation and Maintenance Manual(s).
 - 4. Provide Record As-built Drawings.
 - 5. Return keys to the Owner.
 - 6. Deliver all spare parts.
 - 7. Touch up any damaged finishes.

END OF SECTION 26_0500

SECTION 26_0510 - WIRING METHODS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Building wire and cable.
 - 2. Conduit and tubing
 - 3. Surface raceway.
 - 4. Boxes
 - 5. Wiring devices
 - 6. Wiring connectors
 - 7. Connections.

1.02 RELATED SECTIONS

A. See Section 26 0500 - Basic Electrical Materials and Methods.

1.03 SYSTEM DESCRIPTION

- A. Wiring Products:
 - 1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
 - 2. Stranded conductors for control circuits.
 - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 4. Conductor not smaller than 16 AWG for control circuits.
 - 5. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.

B. Wiring Methods:

- 1. Concealed Dry Interior Locations: Building wire, Type THW THHN/THWN insulation, in raceway. Nonmetallic-sheathed cable. Armored cable. Metal clad cable.
- 2. Exposed Dry Interior Locations: Building wire, Type THW THHN/THWN insulation, in raceway. Nonmetallic-sheathed cable. Armored cable. Metal clad cable.
- 3. Above Accessible Ceilings: Building wire, Type THW THHN/THWN insulation, in raceway. Nonmetallic-sheathed cable. Armored cable. Metal clad cable.
- 4. Wet or Damp Interior Locations: Building wire, Type THW THHN/THWN insulation, in raceway. direct burial cable. Armored cable with jacket. Metal clad cable.
- 5. Exterior Locations: Building wire, Type THW THHN/THWN insulation, in raceway. direct burial cable. Armored cable with jacket. Metal clad cable. Service-entrance cable.
- 6. Underground Locations: Building wire, Type THW THHN/THWN insulation, in raceway. direct burial cable. Armored cable with jacket. Metal clad cable. Service-entrance cable.
- 7. Conductor sizes are based on copper unless indicated as aluminum or "AL". When aluminum conductor is substituted for copper conductor, size to match circuit requirements for conductor ampacity and voltage drop.
- 8. Raceway and boxes are located as indicated on Drawings, and at other locations where required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements.
- C. Raceway Products:

WIRING METHODS

- 1. Underground More than 5 Feet outside Foundation Wall: Use rigid steel conduit and thickwall nonmetallic conduit. Use cast metal boxes or nonmetallic handhole.
- 2. Underground Within 5 Feet outside Foundation Wall: Use rigid steel conduit and thickwall nonmetallic conduit. Use cast metal boxes.
- 3. In or Under Slab on Grade: Use rigid steel conduit and thickwall nonmetallic conduit. Use cast metal boxes.
- 4. Outdoor Locations, Above Grade: Use rigid steel conduit and electrical metallic tubing. Use cast metal outlet, pull, and junction boxes.
- 5. In Slab Above Grade: Use rigid steel conduit and thickwall nonmetallic conduit. Use cast sheet metal boxes.
- 6. Wet and Damp Locations: Use rigid steel conduit, electrical metallic tubing, thickwall nonmetallic conduit and, nonmetallic tubing. Use cast metal or nonmetallic outlet, junction, and pull boxes. Use flush mounting outlet box in finished areas.
- 7. Concealed Dry Locations: Use rigid steel and aluminum conduit, electrical metallic tubing, thickwall nonmetallic conduit and nonmetallic tubing. Use sheet-metal boxes. Use flush mounting outlet box in finished areas. Use hinged enclosure for large pull boxes.
- 8. Exposed Dry Locations: Use rigid steel and aluminum conduit, electrical metallic tubing and thickwall nonmetallic conduit. Use sheet-metal boxes. Use flush mounting outlet box in finished areas. Use hinged enclosure for large pull boxes.
- 9. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.04 SUBMITTALS

- A. Procedures for submittals: See Section 26_0500.
- B. Product Data:
 - 1. Provide wiring device configurations, ratings, dimensions, and color selections.
 - 2. Provide service fitting configurations, dimensions, finish, and color selections.

1.05 CLOSEOUT SUBMITTALS

- A. Operations and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, cleaning procedures, replacements parts list, and maintenance and repair data. Submit recommended maintenance schedule.
- B. Project Record Documents: See Section 26_0500.
- C. Accurately record routing of conduits larger than 2 inches.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with NECA Standard of Installation.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirement of NFPA 70.
- B. Furnish products listed by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction.

WIRING METHODS

PART 2 PRODUCTS

2.01 CONDUIT AND FITTINGS

- A. Conduit:
 - 1. Metal conduit and tubing: Galvanized steel.
 - 2. Flexible conduit: Steel jacket only.
 - 3. Liquid-tight flexible conduit: Flexible conduit with PCV jacket.
 - 4. Plastic conduit and tubing: NEMA TC 2; PVC. Use Schedule 40 conduit.
 - 5. RGS or IMC, 90 degree bends. PVC is not acceptable.
- B. Conduit fittings:
 - 1. Metal fittings and conduit bodies: NEMA FB 1.
 - 2. Plastic fittings and conduit bodies: NEMA TC 3.

2.02 ELECTRICAL BOXES

- A. Boxes:
 - 1. Sheet Metal: NEMA OS 1; Galvanized steel.
 - 2. Cast Metal: Aluminum, deep type, gasket cover, threaded hubs.
 - 3. Non-metallic: NEMA OS 2.
- B. Floor boxes for installation in poured concrete floors: Fully adjustable formed steel.
- C. Hinged Cover Enclosures: NEMA 250; Type 1, steel enclosure with manufacturer's standard enamel finish and continuous hinge cover, held closed by flush latch operable by screwdriver.
- D. Large Cast Metal Boxes:
 - 1. Surface-Mounted Type: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, galvanized cast iron or cast aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
 - 2. Underground Type: NEMA 250; Type 4, outside flanged, recessed cover box for flush mounting, cast aluminum box and plain cover with neoprene gasket and stainless steel cover screws.

2.03 RECEPTACLES

- A. Single Convenience Receptacle:
 - 1. Leviton 5361-I
 - 2. Pass & Seymour 26261-I
 - 3. Or equal performance.
- B. Duplex Convenience Receptacle:
 - 1. Hubbell 5362
 - 2. Pass & Seymour 885-I
 - 3. Or equal performance.
- C. GFCI Receptacle:
 - 1. Hubbell GF5362
 - 2. Pass & Seymour 2091-I

- 3. Or equal performance.
- D. Color: Selected by Owner/Architect.

2.04 WALL PLATES

- A. Manufacturers: to match device
- B. Cover Plate: Nylon or Stainless Steel. Finish selection by architect.
- C. Jumbo Cover Plate: Smooth plastic nylon. Smooth stainless steel. Finish selection by architect
- D. Weatherproof Cover Plate: Gasketed cast metal Stainless steel plate with hinged threaded and gasketed device cover.

2.05 MULTIOUTLET ASSEMBLY

- A. Manufacturers:
 - 1. Wiremold
 - 2. Hubbell
 - 3. Leviton
 - 4. Or equal performance
- B. Multioutlet Assembly: Sheet metal channel with fitted cover, with pre-wired receptacles, suitable for use as multioutlet assembly. Furnish manufacturer's standard enamel finish.
- C. Receptacles: NEMA WD 6, type 5-15R, single receptacle.
- D. Receptacle Spacing: 6 inches 9 inches 12 inches 18 inches on center.
- E. Fittings: Furnish manufacturer's standard couplings, elbows, outlet and device boxes, and connectors.

2.06 SERVICE FITTINGS

- A. Receptacle service fitting:
 - 1. Walker S125R
 - 2. Or equal performance
 - 3. Housing: Zinc die cast material
 - 4. Device plate: Polycarbonate
 - 5. Configuration: One duplex
- B. Communication outlet service fitting:
 - 1. Walker S126R
 - 2. Or equal performance
 - 3. Housing: Zinc die cast material
 - 4. Device plate: Polycarbonate
 - 5. Configuration: Telephone/data combination

WIRING METHODS

- C. Combination fitting:
 - 1. Walker S265
 - 2. Or equal performance
 - 3. Housing: Zinc die cast material
 - 4. Device plate: Polycarbonate
 - 5. Configuration: One duplex receptacle, telephone/data combination
- D. Carpet ring: Brass
 - 1. Walker 829 CK
 - 2. Or equal performance

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Verify that supporting surfaces are ready to receive work.
- B. Verify that interior of building is physically protected from weather.
- C. Verify that mechanical work, which is likely to injure conductors, has been completed.
- D. Completely and thoroughly swab raceway system before installing conductors.
- E. Electrical boxes are shown on drawings in approximate locations unless dimensioned.
 1. Obtain verification from Architect and/or Owner of floor box locations, and locations of outlets in offices and work areas prior to rough-in.

3.02 INSTALLATION

- A. Route raceway and cable to meet Project conditions.
- B. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- C. Adjust box location up to 10 feet prior to rough-in when required to accommodate intended purpose.
- D. Arrange conduit to maintain headroom and to present neat appearance.
 - 1. Route exposed raceway parallel and perpendicular to walls and adjacent piping.
 - 2. Maintain minimum 6 inch clearance to piping and 12 inch clearance to heat surfaces, such as flues, steam pipes, and heating appliances.
 - 3. Maintain required fire, acoustic, and vapor barrier rating when penetrating walls, floors, and ceilings.
 - 4. Route conduit through roof openings for piping and ductwork where possible. Otherwise, route through roof jack with pitch pocket.
 - 5. Group in parallel runs where practical. Use rack constructed of steel channel. Maintain spacing between raceways or derate circuit ampacities to NFPA 70 requirements.
 - 6. Use conduit hangers and clamps. Do not fasten with wire or perforated pipe straps.
 - 7. Use conduit bodies to make sharp changes in direction.
 - 8. Terminate conduit stubs with insulated bushings.
 - 9. Use suitable caps to protect installed raceway against entrance of dirt and moisture.

- 10. Provide No. 12 AWG insulated conductor or suitable pull string in empty raceways, except sleeves and nipples.
- 11. Install expansion joints where raceway crosses building expansion joints.
- 12. Install plastic conduit and tubing in accordance with manufacturer's instructions.
- E. Install auxiliary gutter and wireway in accordance with manufacturer's instructions.
- F. Install electrical boxes as shown on the drawings and as required for splices, taps, wire pulling, equipment connections, and regulatory requirements.
 - 1. Use cast outlet box in exterior locations exposed to weather and wet locations.
 - 2. Use hinged cover enclosure for interior pull and junction box larger than 12 inches in any dimension.
 - 3. Locate and install electrical boxes to allow access. Provide access panels if required.
 - 4. Locate and install electrical boxes to maintain headroom and to present neat mechanical appearance.
 - 5. Install pull boxes and junction boxes above accessible ceilings or in unfinished areas.
 - 6. Provide knockout closures for unused openings.
 - 7. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
 - 8. Coordinate mounting heights and locations of outlets above counters, benches, and backsplashes.
 - 9. Install lighting outlets to locate luminaries as shown on reflected ceiling plan.
- G. Use recessed outlet boxes in finished areas and where indicated.
 - 1. Secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness.
 - 2. Use stamped steel stud bridges for flush outlets in hollow stud wall and adjustable steel channel fasteners for flush ceiling outlet boxes.
 - 3. Locate boxes in masonry walls to require cutting corner only. Coordinate masonry cutting to achieve neat openings for boxes.
 - 4. Do not install boxes back-to-back in walls; install boxes with minimum 24 inches separation.
 - 5. Do not damage insulation.
- H. Install floor boxes in accordance with manufacturer's instructions.
 - 1. Set boxes level and flush with finish flooring material.
 - 2. Use cast floor boxes for installations in slab on grade.
- I. Install service fittings in accordance with manufacturer's instructions.
- J. Interface outlet box, service fitting, and floor box installation with furniture locations.
- K. Neatly train and secure wiring inside boxes, equipment, and panel boards.
- L. Use wire-pulling lubricant for pulling 4 AWG and larger wires.
- M. Support cables above accessible ceilings to keep them from resting on ceiling tiles.
- N. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.
- O. Terminate spare conductors with electrical tape.

WIRING METHODS

- P. Install wiring devices in accordance with manufacturer's instructions.
 - 1. Install wall switches 48 inches above floor, "OFF" position down.
 - 2. Install wall dimmers 48 inches above floor. Derate ganged dimmers as instructed by manufacturer. Do not use common neutral.
 - 3. Install convenience receptacles 18 inches above floor, 4 inches above counters, backsplash, grounding pole on bottom.
 - 4. Install specific purpose receptacles at heights shown on drawings.
 - 5. Install cord and attachment plug caps on equipment. Size cord for connected load and rating of branch circuit overcurrent protection.
- Q. Install wall plates flush and level.
 - 1. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
 - 2. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

END OF SECTION 26_0510

SECTION 26_2701 - ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metering transformer cabinets.
- B. Meter bases.

1.02 RELATED REQUIREMENTS

A. Section 26_0500 - Basic Electrical Materials and Methods.

1.03 REFERENCE STANDARDS

- A. NECA 1 Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association.
- B. NFPA 70 National Electrical Code; National Fire Protection Association.

1.04 SYSTEM DESCRIPTION

A. System Characteristics: 120/240 volts, single phase, three-wire, 60 Hertz.

1.05 SUBMITTALS

- A. See Section 26_0500 Basic Electrical Materials and Methods, for submittal procedures.
- B. Maintain one copy of each document on site.

1.06 QUALITY ASSURANCE

- A. Utility Company: Mora San Miguel Co-op
- B. Perform work in accordance with utility company written requirements and NFPA 70.
- C. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Metering Transformer Cabinets: Sheet metal cabinet with hinged door, conforming to utility company requirements, with provisions for locking and sealing.
 1. Size: As required by utility.
- B. Meter Base: Furnished by Contractor per Utility requirements.
- C. Other Components: As required by utility company.

PART 3 EXECUTION

3.01 **PREPARATION**

A. Arrange with utility company to obtain permanent electric service to the Project.

3.02 INSTALLATION

- A. Install transformer pad and metering transformer cabinets as required by utility company.
- B. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

END OF SECTION 26_2701

SECTION 26_5150 - GENERAL LIGHTING

PART 1GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Interior luminaires.
 - 2. Lamps.
 - 3. Ballasts
 - 4. Accessories.

1.02 RELATED SECTIONS

A. See Section 26 0500 - Basic Electrical Materials and Methods.

1.03 SUBMITTALS

- A. Procedures for submittals: See Section 260500.
- B. Product Data: Submit dimensions, ratings, and performance data for each luminaire and lighting unit.
- C. Samples: Submit two color chips 3 x 3 inch in size illustrating luminaire finish color as indicated in luminaire schedule.

1.04 CLOSEOUT SUBMITTALS

- A. Operations and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, cleaning procedures, replacements parts list, and maintenance and repair data. Submit recommended maintenance schedule.
- B. Project Record Documents: See Section 260500
 1. Record actual location of fixtures.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction.
- C. Conform to applicable code for exit and exitway lighting equipment. Certify inspection and approval from authority having jurisdiction.

1.06 SPARE PARTS

A. Furnish 5% extra lamps and ballasts of each type.

PART 2 PRODUCTS: NOT USED

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install suspended luminaires using pendants supported from swivel hangers.
- B. Locate recessed ceiling luminaires as indicated on Drawings.
- C. Install surface mounted ceiling luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- D. Install lamps in luminaires and lampholders.
- E. Support surface-mounted luminaires directly from building structure. Provide auxiliary support from structural members. T-grid ceilings shall not be used for support of fixtures.
- F. Install recessed luminaires to permit removal from below. Use plaster frames or grid clips.
- G. Luminaire pole bases: Construct as indicated on Drawings or per manufacturer's recommendation. Install poles on bases plumb. Provide for adjustment.

3.02 ADJUSTING AND CLEANING

- A. Aim and align luminaires and lampholders as indicated or directed.
- B. Clean lenses and diffusers at completion of work.
- C. Clean paint splatters, dirt, and debris from installed luminaires.
- D. Touch up luminaire and pole finish at completion of work.
- E. Relamp luminaires, lighting units, and exit signs with failed lamps at Substantial Completion.

END OF SECTION 26_5150

GENERAL LIGHTING

DIVISION 27 – COMMUNICATIONS & IT

SECTION 27_1000 - STRUCTURED CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Communications system design requirements.
- B. Communications pathways.
- C. Copper cable and terminations.
- D. Communications equipment room fittings.
- E. Communications outlets.
- F. Communications grounding and bonding.
- G. Communications identification.

1.02 REFERENCE STANDARDS

- A. EIA/ECA-310 Cabinets, Racks, Panels, and Associated Equipment.
- B. NECA/BICSI 568 Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association.
- C. NFPA 70 National Electrical Code.
- D. TIA-568 (SET) Commercial Building Telecommunications Cabling Standard Set.
- E. TIA-568.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
- F. TIA-569 Telecommunications Pathways and Spaces.
- G. TIA-606 Administration Standard for Telecommunications Infrastructure.
- H. TIA-607 Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
- I. UL 444 Communications Cables.
- J. UL 514C Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.

STRUCTURED CABLING

K. UL 1863 - Communications-Circuit Accessories.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
 - 3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Arrange for Communications Service Provider to provide service.
- C. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- B. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
- C. Evidence of qualifications for installer.
- D. Field Test Reports.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.
- B. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
 - 1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
 - 2. Supervisors and installers factory certified by manufacturers of products to be installed.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
 - 1. Comply with TIA-568 (SET) (cabling) and TIA-569 (pathways) (commercial standards).
 - 2. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
 - 3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
 - 4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
- B. System Description:
 - 1. Building Entrance Cable: By others.
- C. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
 - 1. Locate main distribution frame as indicated on the drawings.
 - 2. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.
- D. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 PATHWAYS

A. Conduit: As specified in Section 26_0510; provide pull cords in all conduit.

2.03 COPPER CABLE AND TERMINATIONS

- A. Copper Horizontal Cable:
 - 1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
 - 2. Cable Type Voice and Data: TIA-568.2 Category 6 UTP (unshielded twisted pair); 23 AWG.
 - 3. Cable Capacity: 4-pair.
 - 4. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.
 - 5. Cable Jacket Color Voice and Data Cable: Blue.
- B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

- C. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
 - 1. Performance: 500 mating cycles.
 - 2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.
- D. Copper Patch Cords:
 - 1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.
 - 2. Patch Cords for Patch Panels:
 - a. Quantity: One for each pair of patch panel ports.
 - b. Length: 5 feet.

2.04 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- A. Copper Cross-Connection Equipment:
 - 1. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
 - a. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
 - b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
 - c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
 - d. Provide incoming cable strain relief and routing guides on back of panel.
- B. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
 - 1. Size: As indicated on drawings.
 - 2. Do not paint over UL label.
- C. Equipment Racks and Cabinets: EIA/ECA-310 standard 19 inch wide component racks.
 1. Wall Mounted Racks: Steel construction, hinged to allow access to back of installed components.

2.05 COMMUNICATIONS OUTLETS

- A. Outlet Boxes: Comply with Section 26 0510.
 - 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
 - 2. Minimum Size, Unless Otherwise Indicated:
 - a. Data or Combination Voice/Data Outlets: 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
- B. Wall Plates:
 - 1. Comply with system design standards and UL 514C.
 - 2. Accepts modular jacks/inserts.
 - 3. Capacity:
 - 4. Wall Plate Material/Finish Flush-Mounted Outlets: High impact thermoplastic, color to be selected.

2.06 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.

2.07 IDENTIFICATION PRODUCTS

A. Comply with TIA-606.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
- B. Comply with Communication Service Provider requirements.
- C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

3.02 INSTALLATION OF PATHWAYS

- A. Install pathways with the following minimum clearances:
 - 1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
 - 2. 12 inches from power conduits and cables and panelboards.
 - 3. 5 inches from fluorescent and high frequency lighting fixtures.
 - 4. 6 inches from flues, hot water pipes, and steam pipes.

B. Outlet Boxes:

a.

- 1. Coordinate locations of outlet boxes provided under Section 26_0510 as required for installation of telecommunications outlets provided under this section.
 - Mounting Heights: Unless otherwise indicated, as follows:
 - 1) Telephone and Data Outlets: 18 inches above finished floor.
 - b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - c. Provide minimum of 24 inches horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

- A. Cabling:
 - 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
 - 2. Do not over-cinch or crush cables.
 - 3. Do not exceed manufacturer's recommended cable pull tension.
 - 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
 - 1. At Distribution Frames: 120 inches.
 - 2. At Outlets Copper: 12 inches.
- C. Copper Cabling:
 - 1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
 - 2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
 - 3. Use T568B wiring configuration.
- D. Wall-Mounted Racks and Enclosures:
 - 1. Install to plywood backboards only, unless otherwise indicated.
 - 2. Mount so height of topmost panel does not exceed 78 inches above floor.

3.04 FIELD QUALITY CONTROL

- A. Comply with inspection and testing requirements of specified installation standards.
- B. Visual Inspection:
 - 1. Inspect cable jackets for certification markings.
 - 2. Inspect cable terminations for color coded labels of proper type.
 - 3. Inspect outlet plates and patch panels for complete labels.
- C. Testing Copper Cabling and Associated Equipment:
 - 1. Test operation of shorting bars in connection blocks.
 - 2. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
- D. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION 27_1000

DIVISION 31 – EARTHWORK

SECTION 31_2311 - EARTHWORK FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work covered by this Section consists of furnishing all plant, labor, equipment, appurtenances and material in performing all operations, hauling, placing, spreading, watering, processing, compacting and shaping earth sections, within the building limits, complete in place in accordance with the Project Manual and Drawings.

1.2 RELATED WORK ELSEWHERE

- A. Under-Slab Vapor Retarder Section 07 2600
- B. General foundation notes on Drawings. In case of conflict or omission, the general foundation notes shall govern.

1.3 SUBSURFACE SOIL DATA

- A. Subsurface soil investigations have been made and the results are available for examination by the Contractor. This is not a warranty of conditions, the Contractor is expected to examine the site and determine for himself the character of materials to be encountered.
- B. No additional allowance will be made for rock removal, site clearing and grading, filling, compaction, disposal, or removal of any unclassified materials.

1.4 REFERENCES

A. ASTM International

1.	ASTM D 1556-07	Standard Test Method for Density of Soil in Place by the Sand-Cone Method
2.	ASTM D 1557-09	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2,700 kN-m/m ³))
3.	ASTM D 4318-10	Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
4.	ASTM D 6938-10	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.5 SUBMITTALS

A. Submit copies of materials certificates and test results for materials in accordance with type of tests, frequencies and remarks as outlined in the sampling and testing schedule.

1.6 TESTING AND INSPECTION

A. General: The Owner shall employ the services of a registered, licensed Geotechnical Engineer to observe all controlled earthwork soil testing. The testing laboratory shall provide continuous

on-site observation by experienced personnel during construction of fill material. The Contractor shall notify the testing laboratory at least two working days in advance of any field operations of controlled earthwork, or of any resumption of operations after stoppages.

- B. Report of Field Density Tests
 - 1. The Geotechnical Engineer shall submit, daily, the results of field density tests required by these specifications.
- C. Costs of Tests and Inspection
 - 1. The cost of testing, inspecting and engineering, as specified in this section of the specifications, shall be borne by the Owner.
- D. Lines and Grades: Alignment and grade of all elements shall be made on true tangents and curves. Grades shall conform to the elevations indicated on Drawings, with minor adjustments, to provide a smooth approach at building lines, at connections to existing paving and to provide proper drainage. Correct irregularities at no cost to the Owner.

1.7 WEATHER LIMITATIONS

A. Controlled fill shall not be constructed when the atmospheric temperature is below 35 degrees F. When the temperature falls below 35 degrees, it shall be the responsibility of the Contractor to protect all areas of completed work against any detrimental effects of ground freezing by methods approved by the testing laboratory. Any areas that are damaged by freezing shall be reconditioned, reshaped, and compacted by the Contractor in conformance with the requirements of this specification without additional cost to the Owner.

PART 2 - PRODUCTS

2.1 STRUCTURAL FILL MATERIAL

A. Material shall consist of soils that conform to the following physical characteristics:

Sieve Size	Percent Passing
Sq. Openings	By Weight
6 inch	100
3 inch	70 - 100
No. 4	50 - 100
No. 200	60 max.

B. The plasticity index of the material to be used for fill or backfill, as determined in accordance with ASTM D 4318 shall not exceed 20.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clearing and Grubbing: Prior to placing structural fill all borrow areas and areas to receive structural fill shall be stripped of vegetation and deleterious materials. Strippings shall be hauled offsite or stockpiled for subsequent use in landscaped areas or non-structural fill areas as designated by the Owner or his representative and approved by the Geotechnical Engineer.

3.2 CONSTRUCTION AREA TREATMENT

- A. Site Preparation Fill Areas: Prior to placing structural fill the areas to be filled shall be scarified to a depth of ten inches and moisture conditioned as described below. The area to be filled shall then be compacted to a minimum of 95 percent of maximum density as determined in accordance with ASTM D 1557. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.
- B. Site Preparation Cut Areas: Following excavation to rough grade all building and pavement areas shall be scarified to a depth of ten inches and moisture conditioned as described below. All building and paved areas shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D 1557.

3.3 EQUIPMENT AND METHODS

A. In areas not accessible to heavy equipment, distribute by and compact with hand operated vibratory compactors.

3.4 BORROW

- A. The Contractor shall provide sufficient material for fill to the lines, elevations and cross sections as shown on the contract drawings from borrow areas.
- B. The Contractor shall obtain from the Owners of said borrow areas the right to excavate material, shall pay all royalties and other charges involved, and shall pay all expenses in developing the source including the cost of right-of-way required for hauling the material.

3.5 COMPACTION

- A. Fill shall be spread in layers not exceeding 8 inches, watered as necessary, and compacted. Moisture content at time of compaction shall be 0% to plus 3 percent of optimum moisture. A density of not less than 95 percent of maximum dry density shall be obtained within the building pads.
- B. Optimum moisture content and maximum dry density for each soil type used shall be determined in accordance with ASTM D 1557.
- C. Compaction of the fill shall be by mechanical means only. Where vibratory compaction equipment is used, it shall be the Contractor's responsibility to ensure that the vibrations do not damage nearby buildings or other adjacent property. Where vibratory compaction is not possible, pneumatic rolling equipment shall be used.

MINIMUM PERCENT COMPACTION	
95	
95	
95	
90	

3.6 MOISTURE CONTROL

A. The material, while being compacted, shall be within the moisture range of 0% to 3% above optimum, well distributed throughout the layer.

3.7 DENSITY REQUIREMENTS

A. Density of undisturbed soils, in-place fill and backfill shall be determined in accordance with the procedures of ASTM D 1556 or ASTM D 6938. If tests indicate that the density of in-place soil is less than required, the material shall be scarified, moistened or dried as necessary to obtain proper moisture content and recompacted as necessary to achieve the proper densities. Sufficient density tests shall be made and reports submitted by the Testing Laboratory indicating all cut and fill areas were compacted and graded in accordance with the requirements.

3.8 SLOPE PROTECTION & DRAINAGE

A. Berming and grading shall be done as may be necessary to prevent surface water from flowing into and out of the construction area. Any water accumulating therein shall be removed by pumping or by other methods.

3.9 SOIL EROSION PROTECTION

- A. The Contractor shall ensure that no soil erodes or blows from the site into public right-of-way or onto private property.
- B. The Contractor shall promptly clean up any material which erodes or blows into the public right-of-way or onto private property.

3.10 PRESERVATION OF PROPERTY

- A. Provide temporary fences, barricades, coverings, or other protections to preserve existing items indicated to remain and to prevent injury or damage to persons or property. Apply protections to adjacent properties as required.
- B. Restore damaged work to condition existing prior to start of work, unless otherwise directed.

3.11 EXISTING UTILITIES

- A. The Contractor shall verify the location of any utility lines, pipelines, or underground utility lines in or near the area of the work in advance of and during Earthwork. The Contractor is fully responsible for any and all damage caused by failure to locate, identify and preserve any and all existing utilities, pipelines and underground utility lines. Repair damaged utilities to the satisfaction of the utility owner at no expense to the Owner.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during grading, consult the Architect immediately for directions as to procedures.
- C. Cooperate with the Owner and public or private utility companies in keeping service and facilities in operation.

3.12 WASTE

- A. Dispose of all waste off Owner's property.
- B. Burning of waste will not be permitted.

3.13 AIR POLLUTION

A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt air pollution. Comply with governing regulations pertaining to environmental protection.

SAMPLING AND TESTING SCHEDULE FOR EARTHWORK FIFLD QUALITY CONTROL						
MATERIAL	TEST FOR	FREQUENCY	REMARKS			
NATURAL GROUND	Compaction in accordance with ASTM D 1556 or ASTM D 6938	1 per 500 square yards of surface	Conduct a minimum of 3 tests on each section.			
EMBANKMENT AND/OR	Soil Conditions Moisture-Density in accordance with ASTM D 1557	Test 1 per soil classification				
SUBGRADE	Compaction control in accordance with ASTM D 1556 or ASTM D 6938	1 per each lift every 300 cubic yards of surface	Immediately after placing, Conduct a minimum of 3 tests per section			

END OF SECTION 31_2311

SECTION 200

EARTHWORK

200.1 GENERAL

This section contains the requirements for earthwork activities associated within rights-of-way easements, or open areas. These activities include: clearing and grubbing, roadway excavation, fill construction, borrow excavation, and open area land leveling. Earthwork requirements for channels, dikes and dams are contained in Section 600, Channel Construction.

200.2 CONTENTS

Section No.	Title
201	Clearing and Grubbing
202	Roadway Excavation
204	Fill Construction
205	Borrow Excavation
207	Lean Fill Construction
210	Open Area Land Leveling

CLEARING AND GRUBBING

201.1 GENERAL

This work shall consist of removing natural and man-made objectionable material from the right-of-way, construction areas, road approaches, material and borrow sites, areas through which ditches and channels are to be excavated, and such other areas as may be shown on the plans. Clearing and grubbing shall be performed in advance of grading operations except that in cuts over 3 feet in depth, grubbing may be done simultaneously with excavation, provided stumps, roots, embedded wood, foundations and slabs are removed as Clearing and grubbing shall be in specified. accordance with the requirements herein specified, such as erosion control requirements. Demolition of structures, other than foundations or slabs, shall be as shown on the plans.

201.2 REFERENCES

201.3 PRESERVATION OF PROPERTY

Existing improvements, adjacent property, utility and other facilities, and trees and plants not to be removed shall be protected from injury or damage resulting from the CONTRACTOR's operations. Only trees and plants designated or marked for removal by the ENGINEER shall be removed.

201.4 CONSTRUCTION METHODS

201.4.1 The natural ground surface shall be cleared of vegetable growth, such as trees, tree stumps, logs, roots or downed trees, brush, grass, weeds, and surface boulders, as well as fences, walls, rubbish, foundations and slabs.

201.4.2 Unless otherwise shown on the plans, the entire area of the project within the limit lines specified below shall be cleared and grubbed. No payment will be made to the CONTRACTOR for clearing and grubbing outside these limits, unless such work is authorized by the ENGINEER.

201.5 LIMIT LINES: Except when limit lines for clearing and grubbing are shown on the plans or are staked by the ENGINEER, clearing and grubbing shall extend only within reasonable limits of the work area.

201.6 REMOVAL OF TREES AND TREE BRANCHES

201.6.1 Trees shall be removed in such a manner as not to injure standing trees, plants, and

improvements which are to remain. Tree branches extending over a roadway and which clear finish grade by 12 feet or less shall be cut off close to the boles in a workmanlike manner.

201.6.2 Trees requiring trimming to facilitate normal construction operations shall be trimmed by a tree surgeon.

201.7 REMOVAL AND DISPOSAL OF DEBRIS

Debris to be removed shall be disposed of outside the right-of-way at a location satisfactory to the ENGINEER, except when burning of combustible debris is permitted. The area to be graded and adjacent areas shall be left with a neat and finished appearance. No accumulation of flammable material shall remain on or adjacent to the property line. In case burning precedes construction operations, the piles may be placed in the center of the area; otherwise, the piles shall be placed in the most convenient location at the side of the area and beyond slope lines where they may be burned without damage to surrounding forest cover or adjacent property. Burning shall be done in conformance with local regulations and at such times and in such manner as to prevent the fire from spreading to areas adjoining the construction site. In areas where burning is prohibited by local regulations, all removed material shall be disposed in an approved solid waste disposal site.

201.8 REMOVAL AND DISPOSAL OF SALVAGEABLE ITEMS

Items and materials of salvage value as shown on the plans or as determined by the ENGINEER, unless incorporated in the new work, shall remain the property of the OWNER and shall be delivered to approved storage areas as directed by the ENGINEER. Such items and materials shall be carefully removed and delivered in such a manner as to permit re-use.

201.9 MEASUREMENT AND PAYMENT

201.9.1 CLEARING AND GRUBBING:

201.9.1.1 When the proposal includes an item for clearing and grubbing, the quantity for measurement shall be as indicated in the Bid Proposal.

201.9.1.2 The unit price per acre paid for clearing and grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in clearing and grubbing as shown on the plans, as provided in these specifications and as directed by the ENGINEER, including the removal and disposal of resulting material.

201.9.1.3 When the Bid Proposal does not include a pay item for clearing and grubbing as above specified and unless otherwise specified in the Supplementary Specifications, full compensation for any necessary clearing and grubbing required to perform construction operations specified shall be considered as included in the price paid for other items of work and no additional compensation will be allowed therefore.

201.9.2 REMOVAL AND DISPOSAL OF TREES: If the Bid Proposal includes separate estimates of quantities for the removal of trees, the trees shall be classified by size as follows:

201.9.2.1 Trees less than 12 inches in circumference at 3 feet above the original ground surface shall be considered as included in the price for clearing and grubbing or excavation, and no additional compensation will be allowed therefor. 201.9.2.2 Trees between 12 and 30 inches in circumference shall be measured as a unit price for each tree in the item provided in the Bid Proposal for trees of this dimension.

201.9.2.3 Trees more than 30 inches in circumference shall be measured as a unit price for each tree in the item provided in the Bid Proposal for trees of this dimension.

SECTION 204

FILL CONSTRUCTION

204.1 GENERAL

Fill construction shall consist of constructing roadway embankments (including the preparation of areas upon which they are to be placed), the placing and compacting of approved material within areas where unsuitable material has been removed; and the placing and compacting of suitable materials in holes, pits and other depressions.

204.2 REFERENCES

204.2.1 ASTM

D 1557 D 4254

204.3 PLACING

204.3.1 Unless otherwise specified, the upper 6 inches of the original ground area upon which fills are to be constructed shall be compacted to a density of not less than 90 percent of maximum density as determined by ASTM D 1557, or in soils containing less than 5 percent passing the #200 sieve, a minimum relative density of 70 percent as determined by ASTM D 4254.

204.3.2 Rocks, broken concrete, or other solid materials which are larger than 4 inches in greatest dimension shall not be placed in fill areas where piles are to be placed or driven.

204.3.3 When fill is to be made and compacted on hillsides or where new fill is to be compacted against existing fill or where embankment is built 1/2 width at a time, the slopes of original hillsides and old or new fills shall be started wherever the vertical cut of the next lower bench intersects the existing ground.

204.3.4 Material thus cut out shall be recompacted along with the new embankment material at the CONTRACTOR's expense, unless the width of the bench required exceeds 4 feet, in which case the excavated material in excess of 4 feet will be measured and paid for as excavation.

204.3.5 Clods or hard lumps of earth of 6 inches in greatest dimension shall be broken up before compacting the material in embankment, except as provided in the following paragraph.

204.3.6 When the fill material includes large rocky material or hard lumps, such as hardpan or cemented gravel which cannot be broken readily, such material shall be well distributed throughout the fill. Sufficient earth or other fine material shall be

placed around the larger material as it is deposited so as to fill the interstices and produce a dense, compact fill. However, such material shall not be placed within 2 feet of the finished grade of the fill.

204.3.7 Embankment construction shall not be performed when material is frozen.

204.4 COMPACTING

204.4.1 Fill shall be constructed in compacted layers of uniform thickness and each layer shall be compacted in accordance with the requirements herein specified with the following exception.

204.4.2 Where fills are to be constructed across low, swampy ground which will not support the weight of hauling equipment, the lower part of the embankment may be constructed by dumping successive loads of suitable material in a uniformly distributed layer of a thickness not greater than that necessary to support the equipment while placing subsequent layers, after which the remainder of the embankment shall be constructed in layers and compacted as specified.

204.4.3 The placing and compacting of approved material within the project (where unsuitable material has been removed, and the filling of holes, pits and other depressions has been accomplished) shall conform to all of the requirements herein specified for compacting fills.

204.4.4 The loose thickness of each layer of fill material before compacting shall not exceed 8 inches, except as provided in the following paragraph for rocky material. The ENGINEER may authorize roadway fill materials to be placed in layers in excess of 8 inches thickness if the CONTRACTOR can demonstrate that the required compaction can be achieved for the full depth of the lift. However, in no case shall the loose layer exceed 24 inches. Each layer shall be compacted in accordance with the following requirements to a density of not less than 90 percent of maximum density, as determined by ASTM D 1557, or in soils containing less than 5 percent passing the #200 sieve, a minimum relative density of 70 percent as determined by ASTM D-4254. In areas of new or widened roadways and required appurtenances, the density of the upper 12 inches shall not be less than 95 percent as determined by ASTM D 1557.

204.4.5 When fill material contains by volume over 25 percent of rock larger than 6 inches in greatest dimension, the fill below a plane 3 feet below

finished grade may be constructed in layers of a loose thickness before compaction not exceeding the maximum size of rock in the material but not exceeding 3 feet in thickness. When more than 65 percent is retained on the No. 4 sieve, moisture and density control is not required.

204.4.6 The interstices around the rock in each layer shall be filled with earth or other fine material and compacted. Broken portland cement concrete obtained from the project excavation will be permitted in the fill with the following limitations.

204.4.6.1 The maximum dimensions of any piece used shall be 6 inches.

204.4.6.2 Pieces larger than 4 inches shall not be placed within 12 inches of any structure.

204.4.6.3 Pieces larger than 2 1/2 inches shall not be placed within 12 inches of the subgrade for paving.

204.4.6.4 "Nesting" of pieces will not be permitted.

204.4.7 At locations where it would be impractical to use mobile power compacting equipment, fill layers shall be compacted to the specified requirements, by any approved method that will obtain the specified relative compaction.

204.4.8 At the time of compaction the moisture content of fill material shall be optimum plus or minus 2 percent. Fill material which contains excessive moisture shall not be compacted until the material is dry enough to obtain the required relative compaction. Full compensation for any additional work involved in drying fill material to the required moisture content shall be considered as included in the unit price per Bid Proposal and no additional compensation will be allowed. Fills shall be maintained to the grade and cross sections shown on the plans until the acceptance of the contract.

204.5 MEASUREMENT AND PAYMENT

Fill construction shall include excavation, placement, compaction and all related work, and shall be measured in place after compaction. Payment will be made on the unit price per cubic yard for compacted fill unless otherwise noted on the Bid Proposal.

SECTION 205

BORROW MATERIAL

205.1 GENERAL

Borrow material shall consist of naturally occurring granular material, such as: pit-run aravel, sand, decomposed granite, or slide rock; and shall be free from wood, vegetation, or other deleterious matter, but shall contain sufficient sand or filler to permit proper compaction of the subgrade. The maximum size of this material shall not be greater than 2/3 the compacted thickness of the course placed in the subgrade. The CONTRACTOR shall notify the ENGINEER sufficiently in advance of opening any material sites so that cross section elevations and measurements of the ground surface after stripping may be taken and sufficient time for testing the material will be allowed.

205.2 REFERENCES

205.2.1 This publication: SECTION 202 SECTION 204

205.3 PLACING AND COMPACTING

Borrow shall be placed and compacted as specified in Section 204. The CONTRACTOR shall satisfy himself that there is sufficient space available in fill locations for placing any excavated material before placing borrow. Any excess excavation which develops as a result of

placing imported borrow in advance of completing excavations shall be disposed of the CONTRACTOR's expense in at accordance with the provisions in Section 202 and a corresponding reduction in the quantity of borrow to be paid for will be made, for which the CONTRACTOR will have no claim for compensation. Borrow pits shall be excavated to regular lines to permit accurate excavation measurement; depth of throughout the areas of borrow pits shall be as uniform as practicable and the side slope shall be dressed to such slope as may be directed by the ENGINEER. leaving the borrow pit area in a clean and safe condition.

205.4 MEASUREMENT AND PAYMENT

205.4.1 Quantities of borrow outside of physical limits of the work will be measured as per cubic yard. Material excavated at the borrow site and not used on the work will be deducted from the computed quantities and no payment will be made therefore.

205.4.2 If borrow is acquired from a commercial pit, alternate methods of determining cubic yardage of borrow material delivered to the site may be used. Such alternate method shall be agreed to and documented by the ENGINEER and CONTRACTOR prior to the start of any borrow operation.

DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 100

MATERIALS

100.1 GENERAL

The contents of Section 100 pertain to materials which are common public works construction items. For convenience selected materials in this section will by referenced in the appropriate construction activity. Materials which are incidental to only one contraction activity will by defined in the activity's section.

100.2 CONTENTS

Section No.	Title
101	Portland Cement Concrete
102	Steel Reinforcement
103	Epoxy-Coated Steel Reinforcement
105	Concrete Curing Compound
106	Cement Mortar and Grout
107	Joint Filler and Sealant Material
108	Brick
109	Riprap Stone
111	Colored Portland Cement Concrete
112	Paving Asphalt (Asphalt Cement)
113	Emulsified Asphalts
114	Asphalt Paving Hot Recycling
115	Slurry Seal Materials
116	Asphalt Concrete
117	Asphalt Rejuvenating Agents
118	Hydrated Lime Mineral Filler
119	Paving Fabrics
121	Plastic Pipe
122	Plastic Liner Plate
123	Reinforced Concrete Pipe
124	Reinforced Concrete Pressure Pipe
125	Vitrified Clay Pipe
127	Steel Water Pipe
128	Concrete Cylinder Pipe
129	Ductile Iron Pipe
130	Gray Iron and Ductile Iron Fittings
135	Corrugated Metal Pipe and Arches (Steel)
136	Structural Steel Plate for Pipe, Arches and Pipe Arches
137	Corrugated Aluminum Pipe and Arches
138	Pipe Arches and Box Culverts
139	Structural and Rivet Steel, Rivets, Bolts,
	Pins and Anchor Bolts
143	Galvanizing
145	Lumber
146	Wood Preservatives
150	Timber Piles
151	Steel Piles
152	Concrete Piles
157	Paint
160	Steel Castings
161	Gray Iron Castings
162	Aluminum Castings
170	Electronic Marker Disks

SECTION 101

PORTLAND CEMENT CONCRETE

101.1.1 GENERAL: Portland cement concrete, prestressed concrete, post tensioned concrete, shotcrete, gunite, and light weight structural concrete shall consist of a mixture of Portland cement, aggregates, water, and admixtures, proportioned, batched and delivered as specified herein. All materials and design mixes used in Portland cement concrete, either batched at or delivered to a project shall be certified in accordance with the requirements of these specifications. Each design mix submitted and authorized for use under this Specification shall be identified by a design mix number, unique to that design mix. If either a change in material(s) or material supplier(s) from that specified in the authorized design mix occurs during a project, authorized use of the job mix formula on the project may be canceled as directed by the ENGINEER. A concrete design mix shall not be used on a project without written authorization of the ENGINEER. A design mix, upon request by a concrete supplier, may be authorized by the OWNER for use on OWNER and OWNER-related projects for a period of 14 months from the date of sampling of reference aggregates in the design mix.

101.1.2 For construction and reconstruction projects requiring portland cement concrete continuous placement(s) equal or greater than either 100 cubic yards of concrete per day, the CONTRACTOR shall have a full time portland cement concrete construction supervisor on site to direct the construction operations. The supervisor shall be certified either as an ACI certified Concrete Field Testing Technician Grade I, or the equivalent National Institute for Certification of Engineering Technologies Technician, with Specialty Concrete Work Elements Level I 82001, 82002, and Level II 84002, 84003, 84004, The supervisor shall be identified by the 84010. CONTRACTOR at the preplacement conference and shall be the contact person for the ENGINEER during concrete construction.

101.1.3 Pre-Placement Conference

A Pre-Placement Conference shall be held by the CONTRACTOR, as directed by the ENGINEER, no later than seven (7) calendar days prior to the start of construction for concrete continuous placement(s) equal or greater than either 100 cubic yards of concrete per day. The following meeting agenda/assigned responsibilities shall be accomplished at the conference.

I. ENGINEER/OWNER

- A. Scope of the project.
- B. Identify construction management team and contact telephone numbers.
- C. Review CONTRACT requirements for construction.
- D. Review Quality Assurance Program.

II.CONTRACTOR

- A. Review construction schedules.
 - 1. Placement schedules.
- 2. Proposed construction schedule for duration of the project.
- B. Identify construction personnel and contact telephone numbers.
 - 1. Contractor Staff
 - 2.Sub-Contractor (s)
 - 3.Supplier (s)
 - 4. Safety Manger
- C. Present construction placement procedure plans. 1.Equipment Schedule
 - 2. Concrete Design Mix
 - 3. Construction methodology
 - 4. Concrete pumping plan
 - 5. Traffic Control Plan
 - 6. Quality Control Plan

III. DISCUSSION AND COMMENT

- 101.2 REFERENCES
- 101.2.1 American Society for Testing and Materials (Latest Edition) (ASTM)
- C31 Making & Curing of Concrete Test Specimens in the Field
- C33 Specification for Concrete Aggregates
- C39 Test for Compressive Strength of Cylindrical Concrete Specimens
- C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- C78 Test for Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading)
- C94 Specification for Ready-Mixed Concrete
- C125 Definition of Terms Relating to Concrete and Concrete Aggregates
- C138 Air Content (Gravimetric), Unit Weight, and Yield of Concrete
- C143 Test for Slump of Portland Cement Concrete specification. If required, certification
- C150 Specification for Portland Cement
- C172 Sampling Fresh Concrete
- C173 Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
- C192 Making & Curing of Concrete Test Specimens in the Laboratory
- C227 Test for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar Bar Method)
- C231 Test for Air Content of Freshly Mixed Concrete by the Pressure Method
- C260 Specification for Air Entraining Admixtures for Concrete
- C330 Specification for Lightweight Aggregates for Structural Concrete
- C441 Test for Effectiveness of Mineral Admixtures in

Preventing Excessive Expansion of Concrete Due to Alkali-Aggregate Reaction

- C494 Specification for Chemical Admixtures in Concrete
- C567 Unit Weight of Structural Lightweight Concrete
- C617 Capping Cylindrical Concrete Specimens
- C618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
- C685 Specification for Concrete Made by Volumetric Batching & Continuous Mixing
- C803 Test for Penetration Resistance of Hardened Concrete
- C805 Test for Rebound Number of Hardened Concrete
- D2419 Sand Equivalent Value of Soils and Fine Aggregates
- 101.2.2 American Concrete Institute (Latest Editions)
- ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
- ACI 211.2 Standard Practice for Selecting Proportions for Structural Lightweight Concrete
- ACI 318-89 Building Code Requirements for Reinforced Concrete
- 101.2.3 This Specification:
- SECTION 337 PORTLAND CEMENT CONCRETE PAVEMENT
- SECTION 340 PORTLAND CEMENT CONCRETE CURBS, GUTTERS, WALKS, DRIVEWAYS, ALLEYS, INTERSECTIONS, SLOPE PAVING, AND MEDIAN PAVING
- SECTION 346 TEXTURED CONCRETE
- SECTION 349 CONCRETE CURING
- SECTION 420 TRAFFIC SIGNAL AND STREET LIGHTING CONDUIT, FOUNDATIONS AND PULL BOXES
- SECTION 510 CONCRETE STRUCTURES
- SECTION 512 PRECAST PRESTRESSED MEMBERS
- SECTION 602 PORTLAND CEMENT CONCRETE FOR CHANNEL LINING AND DIKE AND DAM SURFACING
- SECTION 701 TRENCHING, EXCAVATION AND BACKFILL
- SECTION 800 INSTALLATION OF WATER TRANSMISSION, COLLECTOR AND DISTRIBUTION LINES
- SECTION 900 SANITARY AND STORM SEWER FACILITIES
- SECTION 915 STORM DRAINAGE APPURTENANCES SECTION 1500 MONUMENTS
- 101.3 PORTLAND CEMENT
- 101.3.1 Portland cement to be used or furnished under

this Specification shall comply either with the requirements of ASTM C150, Types I LA, II LA, III LA, and V LA, cements, or as specified herein, in the Supplementary Technical Specifications, Drawings, or as approved by the ENGINEER. The CONTRACTOR shall submit certification of compliance signed by the cement manufacturer, identifying the cement type and source (plant location), stating the Portland cement furnished to the project, and or used in the concrete delivered to the project complies with this Specification. If required, certification of the Portland cement used for each day's concrete placement shall be submitted to the ENGINEER for each type of cement and each design mix used on the project.

101.3.2 Portland cement specified in an authorized design mix shall be of the same source and type for all concrete batched at and/or delivered to a project under the authorized design mix identification number.

101.3.3 When suitable facilities (such as those recommended by the Concrete Plant Manufacturer's Bureau and/or approved by the ENGINEER) are available for handling and weighing bulk cement, such facilities shall be used. Otherwise, the cement shall be delivered in original unopened bags of the Manufacturer and the type of cement plainly marked thereon, each bag to contain 94 pounds (42.6 kg) of cement.

101.3.4 Cement shall be stored in such a manner as to permit ready access for the purpose of inspection and be suitably protected against damage by contamination or moisture. Should any lot of bulk cement delivered to the site show evidence of contamination, the ENGINEER may require that such lot be removed from the site.

101.3.5 Portland cement shall be measured by weight, lbs, (mass, kg) for concrete produced in accordance with the requirements of ASTM C94 and by volume for concrete produced accordance with the requirements of ASTM C685.

101.4 AGGREGATES:

101.4.1 Aggregates shall comply with the requirements of ASTM C33 and as amended herein, or as specified in the Supplementary Technical Specifications and Drawings, or as approved by the ENGINEER. Aggregates shall be certified to comply with the requirements of this Specification and authorized for use by the ENGINEER before the materials may be incorporated in the construction. Prior to delivery of the aggregates or material containing the aggregates, The CONTRACTOR may be required to furnish samples of the aggregates to the ENGINEER for testing. The CONTRACTOR's daily production aggregate gradations used in concrete shall be submitted to the ENGINEER upon request. Aggregates specified in an authorized design mix shall be of the same source and type for all concrete batched and delivered under the authorized design mix identification number.

101.4.2 In placing materials in storage or in moving them from storage to the mixer, no method shall be employed which may cause the segregation, degradation, or the combining of materials of different grading which will result in any stockpile not meeting specified requirements.

101.4.3.1 Aggregates supplied under this Specification shall be assumed to be "alkali-silica reactive", ASR. Variance from this position for a particular aggregate source may be authorized by The ENGINEER. Application for a variance may be made to The ENGINEER.

101.4.3.2 An aggregate may be classified non-alkali-silica reactive if, when tested in accordance with ASTM C227, using low alkali cement demonstrates an expansion at one (1) year not greater than 0.05%, and the rate of expansion is negative decreasing, based on test measurements at 1 month, 3 months, 6 months, 9 months, and 15 months, as authorized by the ENGINEER.

101.4.3.3 Portland cement concrete design mixes using non alkali-silica reactive aggregates complying with 101.4.3.2 will not be required to be proportioned with Class F fly ash.

101.4.4.1 Coarse aggregates shall meet the gradation limits as specified in Table 2 of ASTM C33. Fine aggregates shall comply with the gradation requirements of ASTM C33, Section 4, Grading. The sand equivalent of fine aggregate, when tested in accordance with ASTM D2419, Sand Equivalent Value of Soils and Fine Aggregates, shall be greater than 75.

101.4.4.2 The maximum size aggregate shall comply with either these specifications, or the requirements of Table 101.A, or the Supplementary Technical Specifications, or the recommendations of ACI 318-89, paragraph 3.3.2, or as required by the ENGINEER.

101.4.5 Aggregates shall be measured by weight (mass) for concrete batched under the requirements of ASTM C94 and by volume for concrete batched in accordance with the requirements of ASTM C685.

TABLE 101.A		
MAXIMUM SIZE AGGREGATE		

	Application	Size, in
I.	Pavement, Sidewalk, Curb and Gutter, Drive Pads, Wheel Chair Ramps, Slab on grade, Foundations, and Structures,	1
п	Channels, minimum 5% retained on	11/2

II. Channels, minimum 5% retained on I-1/2 the 1 in sieve

- III. High Early Release Concrete, 3/4 minimum 5% retained on the ½ in sieve
- IV. Stamped, Patterned, Stairs and ½ Steps, minimum 5% retained on the 3/8 in sieve
- V. Formed Concrete
- A. 1/5 the narrowest dimension between sides of forms,
- B. 1/3 the depth of slab,
- C. 3/4 of the minimum clear spacing between individual reinforcing bars or wires, bundles of bars, or prestressing tendons or ducts, or reinforcing and forms.

101.5 WATER

Water used in Portland cement concrete shall be clean and free from injurious amounts of oil, acids, alkalis, salts, organic materials, or other substances that may be deleterious to the concrete or reinforcement. Non-potable water shall not be used unless the requirements of ACI 318.3.4.3.2 are met. Water shall be measured by weight or volume for concrete batched under the requirements of ASTM C94 and by volume for concrete batched in accordance with the requirements of ASTM C685.

101.6 ADMIXTURES:

101.6.1 Admixtures shall comply with the requirements of this specification. The CONTRACTOR shall submit a certification of compliance signed by the admixture manufacturer, identifying the admixture and its source (plant location), stating the admixture furnished to the project and/or used in the concrete delivered to the project complies with this Specification. Certification laboratory testing of an admixture shall be submitted by the CONTRACTOR to the ENGINEER upon request. Admixtures specified in an authorized design mix shall be of the same source and type for all concrete batched and delivered as defined under a design mix identification number. Admixtures shall be measured accurately by mechanical means into each batch by equipment and in a method approved by the ENGINEER. An admixture shall not be used on a project without authorization by the ENGINEER.

101.6.2 Air-entraining agent, conforming to ASTM C260, shall be measured accurately by mechanical means into each batch by equipment and in a method approved by the ENGINEER. The air-entraining agent used shall not contain more than 0.035% chloride by weight. Air-entrainment content shall comply with the requirements Table 101.B., the Supplementary Technical Specifications, or the recommendations of ACI 318, latest
edition.

Nominal Maximum Size Aggregate,	Air Content Range, (%)		
in.	min	max	
1/2	5.5	8.5	
3/4	4.5	7.5	
1	4.5	7.5	

101.6.3 Chemical admixtures shall conform to either the requirements of ASTM C494, or as specified in the Supplementary Technical Specifications, or as specified by the ENGINEER. Chemical admixtures shall not contain more than 0.035% chloride by weight.

101.6.4.1 Mineral admixtures shall be class "F" fly ash complying with the requirements of ASTM C618 including the requirements of TABLE 4, UNIFORMITY REQUIREMENTS, and the requirements of this Specification.

101.6.4.2 Mineral admixtures, when tested in accordance with ASTM C441, shall conform to the following:

Reduction in expansion @ 14 days, % , min, 65.0 100% Reliability

Mortar expansion @ 14 days, max, % 0.20

Expansion must be less than control sample expansion.

101.6.4.3 The "Reactivity with Cement Alkalis" shall be determined using new Dow Corning glass rod base for aggregate. If a fly ash does not comply with the above requirement using the specified cement type, it may be authorized if the criteria is met using the low alkali Portland cement typically available to the Albuquerque area, as directed by the ENGINEER.

101.6.4.4 Mineral admixtures used or furnished under this Specification shall be certified quarterly, in a calendar year, to comply with this Specification by the supplier. Certification shall include test results and specifications, source and location.

101.6.4.5 Mineral admixtures shall be measured by weight (mass) for concrete batched under the requirements of ASTM C94 and by volume for concrete batched in accordance with the requirements of ASTM C685.

101.6.5 Accelerating admixtures may be used in Portland cement concrete batched and supplied under this Specification only when approved by the ENGINEER. The accelerating admixture used shall be a non-chloride type. A design mix proportioned with an accelerating admixture shall be submitted as specified in paragraph 101.8.8. and authorized by the ENGINEER, prior to use on a project.

101.7 PROPORTIONING

101.7.1 Portland cement concrete shall he proportioned in accordance with the requirements of ACI 318, latest edition, Chapter 5, either ACI 211.1 or ACI 211.2 (latest editions), and Table 101.C of this Specification, either field experience or trial mixtures, and the construction placement requirements selected by the CONTRACTOR. The CONTRACTOR shall be solely responsible for the portland cement concrete design mix proportions for concrete either batched at, or delivered to, placed and finished at the site. Certification of a design mix and all component materials, including all formulations of a mix and any and all admixtures which may be used under special construction conditions and environments with that mix to include high range water reducers (super-plasticizer), accelerating admixtures and retarders, and any other admixture, shall comply with the requirements of this Specification.

101.7.1.1 Design mix(es) shall be prepared in a laboratory accredited in accordance with the requirements of the New Mexico State Highway and Transportation Department "Procedure for Approval of Testing Laboratories to Perform Inspection, Testing, and Mix Design Services", April 13, 1998 Edition, and operated under the direct supervision of a New Mexico registered Professional Engineer.

101.7.1.2 The testing equipment used in the design development testing shall be calibrated annually with calibration standards traceable to the National Bureau of Standards. Certificates of calibration shall be maintained at the laboratory for review by the ENGINEER. A copy of the certifications shall be submitted to the ENGINEER upon request. A portland cement concrete design mix shall not be batched at and/or delivered to a job site without written authorization of the ENGINEER.

101.7.1.3 A design mix shall be prepared under the direct supervision of a New Mexico Registered Professional Engineer.

101.7.2 Portland cement shall be proportioned to comply with the requirements specified in Table 101.C, or as specified in the Supplemental Technical Specifications, or Plans, or as authorized by the ENGINEER.

101.7.3 The mineral admixture Class F fly ash shall be proportioned by weight of cement to provide a fly ash to portland cement ratio not less than 1:4, not less than 20 per cent of the total cementitious material. Portland cement concrete submitted under this Specification shall be proportioned with Class F fly ash, unless a variance is authorized by the ENGINEER.

107.7.4 The water to total cementitious material ratio shall not be greater than specified in Table 101.C, or the maximum determined from a "trial mix" compressive strength vs. water to cementitious ration curve, defined in accordance with ACI 318, latest edition, Chapter 5. The trial mix compressive strength water to cementitious material ratio curve shall be developed with the target slump at design application maximum, ± 0.75 inches, and the target entrained air content at design application maximum, ± 0.5 per cent, using materials specified in the design submittal. The cementitious material shall be defined as the total weight of portland cement and Class F fly ash in design mix.

101.7.5.1 A design mix submittal shall include but not be limited to the following information, as directed by the ENGINEER.

A. Certification of compliance of the design mix with the requirements of this Specification and by the New Mexico Registered Professional Engineer in responsible charge of the design mix development;

B. Certification of compliance of design mix's component materials by a manufacturer/supplier. The certification shall include laboratory test results of companion samples of the component material used in the laboratory prepared design mix, verifying the component materials comply with the specifications. For a mix design based on statistical methods, certification(s) of component materials shall be based on results performed within two (2) months of the submittal date.

C. Plastic characteristics of the design mix to include concrete temperature, slump, entrained air content, wet unit weight, yield and cement factor, reported in English and metric units;

D. Performance characteristics of the hardened concrete to include the compressive strength of all test cylinders averaged for a respective test and the corresponding average compressive strength reported in English units;

E. Compressive strength test (3 cylinder tests each point) shall be reported for each water to cementitious material ratio design mix proportioned at 3, 7, 14 and 28 days laboratory cure normal concrete; and, 1 day, 3 days, 7 days and 28 days laboratory cure for high early release concrete.

F. The "trial mix" compressive strength vs. water to cementitious ratio curve graphically plotted to include the water to cementitious ratio for the proposed design mix. A proposed design mix water to cementitious ratio outside the limits of a trial mix curve shall be rejected.

G. When a proposed design mix is based on statistical analysis of historical data, certification that the design mix represented by the historical data was batched with the same or similar materials from the same sources as the materials proposed in the design mix shall be included in the submittal. Under this design certification procedure, the proposal shall include a statistical analysis for a period of 12 months prior to sampling aggregates of the characteristics of a) slump, b) entrained air, and c) $f_c@28$ day compressive strength test. A compressive strength test shall be the average of two (2) cylinders tested at 28 days. An annual average aggregate gradation analysis may be used if the data represents the 12 month period prior to sampling for a design mix. A minimum of three production gradations per month will be required in the data base, as directed by the ENGINEER.

H. Batch proportions for concrete made by Volumetric Batching and Continuous Mixing, ASTM C685, shall include 1) component batch weights, 2) component batch volumes, and 3) gate settings for each type of batching equipment the design mix that may be batched.

J. High Range Water Reducing Admixture(s) (hrwra), Superplastizers

- a.A prescription for use of the hrwra in a design mix shall be provided by the CONTRACTOR to include but not limited to the following
 - 1. Maximum dosage per cubic yard (meter) by standard measure, ozs/yd³;
 - 2. Admixture introduction location (plant or Job site);
 - 3. Minimum mixing after admixture introduction (drum revolution count at mixing speed);
 - 4. Air entrainment dosage adjustment, if required;
 - 5. Base mix water reducing admixture (wra) dosage adjustment, if required;
 - 6. Consistency (slump) targets for before and after admixture introduction;
 - 7. Concrete temperature limitations, if required; and,
- b.Laboratory demonstrated performance of the design mix, at the specified maximum admixture dosage, shall be reported, including slump, entrained air content, unit weight, water to cementitious materials ratio, seven (7) and twenty eight (28) day compressive strength (fc), and three (3) days and seven (7) day compressive strength (fc) for high early release concrete. Submittal compressive strength shall be based on the average value of three cylinders required.
- K. Accelerating Admixture(s)
 - a.A prescription for use of the accelerating admixture in a design mix shall be provided by the CONTRACTOR to include but not limited to the following:
 - 1. Maximum dosage per cubic yard (meter) by standard measure, ozs/yd³;
 - 2. Concrete temperature limitations, if required;
 - 3. Admixture introduction location, plant or project;

- 4. Restrictions of use in combination with other admixtures, as applicable; and,
- b.Special considerations for mixing, placing, and curing, as applicable.
- L.Color Admixture(s)
 - a. A prescription for use of a color admixture in a design mix shall be provided by the CONTRACTOR to include but not limited to the following:
 - 1.Maximum dosage per cubic yare (meter) by standard measure, ozs/yd³;
 - 2. Admixture introduction location, plant or project;
 - 3. Restrictions of use in combination with other admixtures; and
 - b.Special considerations for mixing, placing, and curing, as applicable.
- M. Submittal Format

- a.A standard design mix submittal may include some or all of the above information as directed by the CONTRACTOR to define use as "optional" admixture(s). The standard design mix code would be the same for applications with and without the optional admixture(s)
- b.A specific design mix submittal can be made to include either color, or accelerating, or high range water reducing admixture for use under a specified application only. Separate design mix submittals will be required to include the information specified above.

101.7.5.2 A submittal shall be rejected if it does not include the specified information and samples. A design mix submittal shall be accepted or rejected within ten (10) days of receipt by the ENGINEER.

TABLE 101.C - DESIGN MIX SPECIFICATIONS-PORTLAND CEMENT CONCRETE [1, 2, 3]

Application	Use In Section(s)	f 'c @ 28	Entrained Air Range	Slump, Not To Exceed, nte [5]	Portland Cement	w:(c+fa) max [7]
		1	01-6			

		days psi, min	[11]	Placomont	<u>ir</u> Norm	hches	min, lbs./yd ³	
Interior Concrete (beated areas)		[4]	(See	Flacement	NOTTI	ΠΚΨΚΑ		
Foundations and slab on grade.	510	3,000	par.101.7.2)	Hand Place	4	6	423	0.50
Exterior Concrete a) Structure, foundations, slab on grade, steps/stairs; b) sidewalks, drive pads, wheel chair ramps, stamped pattern concrete, curb & gutter, and valley gutter; c) storm drain structures, channels, drop inlets, and manhole bases; d) retaining walls; and, e) miscellaneous concrete.	340, 346, 420, 510, 511, 602 [12,13], 701, 800, and, 1500	3,000	(See par.101.7.2)	Hand Place	4	6	470	0.45
				Slip Formed	2	3		
Pavement For design of PCCP, use MR= 600 lbs/in ² [4]	337	4 000	(See	Hand Place	4	6	564	0.40
· · · · · · · · · · · · · · · · · · ·	557	4,000	par.101.7.2)	Slip Formed	2	3	504	
<u>Hydraulic Structures</u> Reservoirs	510 and	3,500	(See	Hand Place	4	7	517	0.40
	512		par. 101.7.2)	Slip Formed	2	3		
<u>Structures</u> Buildings, bridges/bridge decks, and parking structures	500	4,000 [8, 9]	(See par.101.7.2)	Hand Place	4	7	564	0.40
			. ,	Slip Formed	2	3		
Sanitary Sewer Facilities Structures, manholes and bases	900	4,000	(See	Hand Place	4	7	658 [6]	0.40
	900	[8, 9]	par.101.7.2)	Slip Formed	2	3	000 [0]	
High Early Release Concrete fcr= 3.400 lbs/in ² @ release to service [10]	All	4,000 @ 7	(See	Hand Place	4	7	Design	Design
	applications	days	par.101.7.2)	Slip Formed	2	3	DESIGN	

1. Use of material(s) not defined by this specification must be approved by the ENGINEER.

2. Maximum size aggregate shall comply with the requirements of par. 101. 4.4.2.

- 3. Portland cement concrete shall be proportioned with Class F fly ash complying with the requirements of 101.6.4, proportioned 1: 4, minimum, fly ash to portland cement, by weight.
- 4. *MR*-Modulus of Rupture, *fc*-compressive strength at 28 days.
- 5. When authorized by the ENGINEER, a high range water reducing admixture (HRWRA), super plasticizer, may be used to increase slump. When a HRWRA is proposed for use on a project. The design mix shall be proportioned to include the HRWRA. The use of a HRWRA in a design mix that was not originally proportioned with a HRWRA is not acceptable under this specification. Higher slump(s) may be used, as directed by the ENGINEER.
- 6. If portland cement complying with ASTM C150 Type VLA is used, a minimum of 564 lbs/cy may be used.
- 7. "w : (c+fa)" is defined as *water to cementitious* materials ratio: w-water; (c+fa)-cementitious material as the sum of the portland cement and fly ash. Units are lbs/yd³.
- 8. Lightweight structural concrete for structures, parking decks, and bridge decks shall be proportioned with a minimum compressive strength of f'c= 4,750 lbs/in² @ 28 days.
- 9. Minimum requirements for prestressed/post tensioned concrete. Actual criteria may differ as specified in the plans and supplemental technical specifications.
- "High Early Release Concrete" may be used where early release of structure to either service or construction loads may be required (≤ 3 days), as authorized by the ENGINEER. "fcr" is the minimum compressive strength for release, as determined by field cured cylinders. Maximum size aggregate shall be 3/4 inch.
- 11. Designated interior concrete, placed, finished, cured, and maintained by the Contractor in a temperate environment of 40°F or greater, may be constructed with non air entrained concrete complying with all other

requirements of this specification for the calendar period after April 30 and before October 1, as authorized by the Engineer. Concrete for wet exposures, showers and wash down areas, vehicle repair and storage floors shall not be included in this variance.

101.8 BATCHING

101.8.1 Portland cement concrete shall be batched in accordance with the requirements of either ASTM

C94, or ASTM C685, and the requirements of this Specification, as authorized by the ENGINEER. Batching facilities, mixing, and transporting equipment shall be certified within 12 months prior to batching of a design mix. The plant shall be certified by a NM Registered Professional Engineer, to comply with the requirements of this Specification. The certification shall have been competed within 12 months of batching an authorized portland cement concrete design mix. Written certification shall be available for review at the plant by the ENGINEER, and, submitted to the ENGINEER upon request.

101.8.2.1 Ready-mix concrete batch plants shall be certified to comply with the requirements of this Specification. Written certification of compliance shall be available for review at the batch plant by the ENGINEER.

101.8.2.2 Central-Mix Batch Plants shall be certified to comply with this Specification and standards of the National Ready-Mix Concrete Association. The central-mixers rated capacity shall be posted at the batch plant in the operator's area.

101.8.2.3 Portable batch plants shall be certified after erection at a project and prior to batching concrete to be used at the project site. The batch plants rated capacity shall be posted at the batch plant in the operator's area.

101.8.2.4 Ready-mix concrete trucks shall be certified to comply with the requirements of this Specification and the "Standards for Operation of Truck Mixers and Agitators of the National Ready-Mix Concrete Association", and the "Truck Mixer Manufacturer Bureau", latest editions. Written certification of compliance shall be carried in/on the vehicle for verification by the ENGINEER. The manufacturers rated capacity, mixing and agitating speeds shall be posted on the truck mixer. Mixers shall have an operable mixer drum revolution counter and water metering system to measure temper water that may be added to a mixer after batching and prior to discharge of a load.

101.8.2.5 Shrink-mixed concrete batching shall be certified to comply with the requirements of this Specification. Written certification of the program to include a) maximum concrete volume defined for the process/equipment, b) minimum time of mixing in the stationary mixer of materials after the addition of all cementitious material, and, c) minimum supplemental mixing revolutions in the transit mix truck. A copy of the certified procedure shall be shall be available at the batch plant for review by the ENGINEER, and submitted upon request. the ENGINEER shall be notified by the CONTRACTOR in writing which concrete supplied to a project is produced with this procedure. Shrink mixed batching shall not be used on a project without authorization by the ENGINEER.

101.8.2.6 Volume batching central mix and concrete mobile trucks shall be certified to comply with this Specification. Certification shall include

discharge gate settings/material weight batching references for each material carried and a certified water meter and calibration chart to define water settings. Discharge calibration settings shall be established for each production batching rate and authorized design mix batched. The equipment shall be recalibrated if a change in materials or source of materials occurs. Written certification of compliance shall be carried in/on the vehicle for verification by the ENGINEER.

101.8.2.7 On-site batching and mixing equipment for concrete volumes of less than 1 cubic yard shall conform to the requirements of ASTM C192, and shall be approved by the ENGINEER. On-site batched concrete for volumes less than 1 cubic yard shall be either "Redi-2-Mix", "Quikrete", or equal prepackaged concrete mix. The concrete shall be proportioned with water not to exceed a maximum of 1.5 gallons per 60 lbs./bag or equivalent. Concrete batched under this paragraph shall not be used for finished, interior and/or exterior exposed concrete surfaces.

101.9 MIXING

101.9.1 Concrete batched in accordance with ASTM C94, shall be mixed in accordance with the requirements of that Specification and as follows.

101.9.2 Central-Mixed Plants: Concrete mixed in a stationary mixer and transported to the point of delivery shall be mixed from the time all the solid materials are in the drum. The batch shall be so charged with some water in advance of the aggregates and cementitious materials, and all water shall be in the drum by the end of one-fourth the specified mixing time. Mixing time shall be a minimum of 1 minute for the first cubic yard plus 15 seconds for each additional cubic vard, or fraction there of additional capacity. Where mixer performance tests have been conducted in accordance with ASTM C94, with the mixer to rated capacity, the mixing time may be reduced to the time at which satisfactory mixing defined by the performance tests shall have been accomplished. When the mixing time is so reduced the maximum mixing time shall not exceed this reduced time by more than 60 seconds for air entrained concrete. Certified concrete uniformity tests shall be conducted in accordance with ASTM C94. If the uniformity requirements are not met, that mixer shall not be used until the condition is corrected.

101.9.3 Shrink-Mixed Concrete:

Concrete mixed in a shrink mix production program shall be mixed in accordance with the certified shrink mix program as defined by the CONTRACTOR. Concrete shall be mixed in a stationary mixer not less than the certified minimum mixing time after all ingredients are batched into the drum, and not less than the minimum mixing revolutions specified for the transit mix truck after the load is transferred into the transit mix truck. Mixing in the transit mix truck shall not exceed the maximum requirements of paragraph 101.9.4. Shrink-mixed concrete procedures shall be certified to provide concrete that complies with the uniformity specifications of ASTM C94 as determined by uniformity tests specified in ASTM C94, for the maximum batch volume of concrete defined by the CONTRACTOR. If uniformity requirements are not met for the combination of stationary plant and transit mixers , the shrink mix program shall not be used. Tempering of shrink mix concrete at the job site shall comply with the requirements of 101.10 and 101.11.

101.9.4 Truck-Mixed Concrete:

Concrete mixed in a truck mixer shall be mixed after all ingredients including water, are in the drum at least 70 revolutions and not more than 100 revolutions at the mixing speed as defined by the Manufacturer. The mixing speed for the mixer shall be identified on the mixer. Certified concrete uniformity tests shall be conducted on transit mixer trucks in accordance with ASTM C94 and annually. If the uniformity requirements are not met, that mixer shall not be used until the condition is corrected. Mixing beyond the number of revolutions at mixing speed found to produce the required uniformity of concrete shall be at the agitation speed defined by the mixer manufacturer. The manufacturer's recommended mixing and agitation speeds shall be posted on the truck mixer.

101.9.5 Volume Batched Concrete:

Concrete batched in accordance with ASTM C685, shall be mixed in accordance with the requirements of this Specification and the Manufacturer's recommendations. The continuous mixer shall be an auger type mixer or any other type suitable for mixing concrete to meet the requirements for uniformity specified in ASTM C685,

101.10 TEMPERING BATCHED CONCRETE

101.10.1.1 The slump of a concrete mix sampled at final discharge shall comply with the requirements of TABLE 101.C. Non complying material shall be removed from the structure as directed by the ENGINEER.

101.10.1.2 A load of concrete may only be tempered with water after the mix cycle is complete when, upon arrival at the job site, the slump of the concrete is less than specified, and the time limit and revolution limit specified in 101.9 are not exceeded.. When additional water is required, the total water in the truck shall not exceed the maximum water to cementitious ratio specified in the authorized design mix when the concrete is discharged. When tempering is required and allowed as defined by the water to cementitious ratio for the design mix, the water shall be injected into the mixer and the drum or blades turned a minimum of 30 revolutions at mixing speed before discharge as long as the revolution limit specified in 101.9 is not exceeded.. Additional water shall not be added to the batch after tempering without authorization by the ENGINEER.

101.10.1.3 When the slump of a sample taken within the time limits specified in 101.9 the specification requirements of TABLE 101.C, the mixer truck may be mixed a minimum of 15 revolutions at mixing speed, as long as the revolution limit specified in 101.9 is not exceeded, sampled and tested. If the slump of the second sample exceeds the maximum specified slump by 0.25 in (6 mm), the load may be rejected as directed by the ENGEINEER.

101.10.2.1 The air content in air entrained concrete, when sampled from the transportation unit at the point of discharge, shall comply with the requirements of this specification. Non complying material shall be removed from the structure as directed by the ENGINEER.

101.10..2.2 When a preliminary sample taken within the time limits specified in 101.9 and prior to discharge for placement shows an air content below the minimum specified level, the CONTRACTOR may add additional air entraining admixture to achieve the specified air content, if the revolutions on the drum counter are less than 300, and the total revolutions, after air entrainment addition will not exceed 300 following mixing a minimum of 30 revolutions at mixing speed after dosage with the admixture. Additional air entraining admixture may not be added to the batch after the initial air entraining admixture tempering. Air entraining admixture shall be batched in accordance with 101.7.2. In addition to sampling and testing for compliance after tempering with the air entraining admixture, a sample shall be taken during discharge from the second half of the load to verify slump and entrained air compliance through the load with the specification.

101.10.2.3 When the entrained air exceeds the specified requirements, the load may be mixed a minimum of 15 revolutions, sampled and tested, if the drum revolutions do not exceed 300, and will not exceed 300 following mixing. If the entrained air exceeds the specification by 0.1 %, the load may be rejected as directed by the ENGINEER.

101.10.3 High range water reducing admixtures, superplasticizers shall be batched as recommended by the manufacturer.

101.10.4 Aggregates and cementious material may not be used to temper a batched load of portland cement concrete.

101.10.5 All samples shall be tested for slump, entrained air, and unit weight after tempering..

101.10.6 The field dosage amounts of admixtures and water shall be reported on the truck ticket.

101.10.7 The OWNER shall pay for quality assurance sampling and testing specified 101.15, or as directed by the ENGINEER.

101. 11 DELIVERY & DISCHARGE:

101.11.1 Discharge of the concrete shall be completed within 1-1/2 hours or before the drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates. These limitations may be waived by the ENGINEER if (1) the concrete is proportioned and certified for use after mixing/agitation time in excess of 1-1/2 hrs, or (2) is of such a slump that it can be placed and finished, without the addition of water to the batch after the time limit noted above is exceeded. In hot weather or under conditions contributing to quick stiffening of the concrete, a time less than 1-1/2 hrs. may be specified by the ENGINEER.

101.11.2 The minimum discharge temperature of concrete in cold weather shall be equal or greater than the temperature specified in Table 101.D.

TABLE 101.D - Cold Weather Construction Concrete Temperature, min [1]

Ambient Air Temperature	Thin Sections	Heavy Sections & Mass Concrete [2]
30 to 45 $^{\circ}$ F	60°F	50°F
0 to 30 $^{\rm O}$ F	65°F	55°F
Below O ^O F	70°F	60°F

- [1] The maximum concrete discharge temperature of all concrete, except "high early release concrete", produced with heated aggregates, heated water, or both, shall be 70°F. The discharge temperature of "high early release concrete" in cold weather shall be 70 °F - 76 °F.
- [2] Sections having dimensions in all directions greater than 2 feet (24 inches)

101.11.3 The discharge temperature of concrete in hot weather should be kept as cool as possible. Concrete supplied to a project site having a discharge temperature greater than 90 °F may be rejected by the ENGINEER if the concrete cannot be placed and finished after a single tempering with water as authorized under 101.10. Retarding admixtures may be used to control setting in hot weather. The discharge temperature of "high early release concrete"in hot weather shall be specified by the CONTRACTOR. 101.11.4 The CONTRACTOR shall provide to the ENGINEER with each batch of concrete batched and/or delivered to the job site, before unloading at the site, a delivery batch ticket on which the information specified in TABLE 101.E is printed, stamped or written, certifying said concrete. One copy of the ticket shall be available for the ENGINEER and one copy of the ticket shall be available for the quality assurance testing program.

TABLE 101.E BATCHING TICKET INFORMATION REQUIREMENTS

- A. Name of Concrete Supplier
- B. Delivery Ticket Number
- C. Date of Delivery
- D. Contractor
- E. Project Name (Optional)
- F. Design Mix Number
- G. Volume of Concrete in Load
- H. Time loaded
- J. Batched Weight (mass) of Cement
- K. Batched Weight (mass) of Fly Ash
- L. Batched Weight (mass) of Fine Aggregate
- M. Batched Weight (mass) of Coarse Aggregate(s)
- N. Batched Weight (mass) or Volume of Each Admixture
- O. Weight or volume of water batched at the plant
- P. Design Mix Target Proportions
- Q. Weight or volume (gal.) of temper water added at the site
- R. Weight or volume of each temper admixture added at the site
- S. Signature and name (printed) of CONTRACTOR'S representative who authorized the tempering, if any, at the site and affiliation to project

101.12 PLACEMENT

101.12.1 Portland cement concrete shall be placed to the lines, sections, grades and elevations, with the procedures specified in the CONTRACT documents. The material shall be consolidated to eliminate all voids, internal rock pockets and defects in the finish concrete. Casting subgrade and formed surfaces shall be damp, at the placement of the concrete. Removable forms shall be treated with a form release agent prior to placement of the forms for ease of removal of the forms without damage to the supported concrete. Forms shall be sealed to prevent leakage. Form release agents shall not stain the adjacent concrete. Placement and finishing shall be completed prior to the start of the initial set of the concrete.

101.12.2.1 The CONTRACTOR shall submit a concrete pumping plan to the ENGINEER for review and authorization one week prior to the start of a pumped concrete construction program for placements complying with 101.1.1. The submittal should identify the pump manufacturer, size and type, rated capacity(s) for the line diameter(s) to be used and distance(s) to be pumped.

101.12.2.2 Pumping shall conform to the recommendations of the pump manufacturer. The pump manufacturer's operation manual shall be available on the pump equipment, and submitted to the ENGINEER, upon request.

101.12.2.3 Concrete shall be pumped in a uniform continuous flow to point of discharge, with all lines kept full, during the pumping operation. The CONTRACTOR shall provide either a system for controlled discharge of the concrete, or the last 5 feet of the pump line, immediately prior to the line discharge opening, shall have a slope equal or less than 10:1, horizontal to vertical, during the pumping of concrete, as authorized by the ENGINEER. The concrete shall not be dropped a vertical distance greater than four feet at discharge from the pump line without a tremey. Concrete placed by pump shall conform to the requirements of this specification after discharge from the pump line. Pumping of concrete shall not commence without authorization by the ENGINEER.

101.13 FINISHING

The CONTRACTOR shall finish Portland cement concrete as required by the CONTRACT documents, Supplemental Technical Specifications, or as directed by the ENGINEER.

101.14 CURING CONCRETE

The CONTRACTOR shall cure concrete as required by the CONTRACT documents, SECTION 349 of this specification, the Supplemental Technical Specifications, or as directed by the ENGINEER. A concrete structure or element shall not be released to service loads until it has achieved a minimum of 85% of the design strength, f'c, at the time the structure is placed in service, or the curing program specified in SECTION 349 is completed, or as directed by the ENGINEER. Service loads shall include construction loads, design loads and environmental exposure.

101.15 QUALITY ASSURANCE SAMPLING AND TESTING

101.15.1.1 Quality assurance sampling and testing shall be performed in accordance with the requirements of this Specification, the Supplemental

Technical Specifications, or as required by the ENGINEER. Concrete shall be sampled and tested by a technician/engineer certified as either an ACI certified Concrete Field Testing Technician Grade I, or the equivalent National Institute for Certification of Engineering Technologies Technician, with Specialty Concrete Work Elements Level I 82001, 82002, and Level II 84002, 84003, 84004, 84010.

101.15.1.2 Quality assurance testing and analysis shall be performed in a laboratory accredited in accordance with the requirements of the New Mexico State Highway and Transportation Department "Procedure for Approval of Testing Laboratories to Perform Inspection, Testing, and Mix Design Services", April 13, 1998 Edition, under the direct supervision of a New Mexico Registered Professional Engineer.

101.15.1.3 Testing equipment used in the performance of specified testing shall be calibrated annually with calibration standards traceable to the National Bureau of Standards. Certification records shall be maintained at the laboratory for review by the ENGINEER. A copy of the certifications shall be submitted upon request to the ENGINEER. Quality assurance testing shall be directed by the ENGINEER and paid by the OWNER

101.15.2.1 Samples will be taken in the field by the ENGINEER, in accordance with ASTM C172, at discharge to the structure/application after all tempering at the job site has been completed.

101.15.2.2 A sample shall be taken for each design mix of concrete placed each day, once for each 100 cu yd of concrete, once for each 5000 sq.ft. area of slabs or walls, or fractions thereof, whichever is greater, or as directed by the ENGINEER. Hi-lo thermometers will be provided by the CONTRACTOR to monitor field curing concrete temperatures and companion test specimens while in the field, as directed by the ENGINEER.

101.15.3 Slump tests will be performed on each quality assurance sample in the field in accordance with ASTM C143. Concrete used for slump tests shall not be used in specimens for strength tests. The slump shall not exceed the maximum value defined in TABLE 101.C plus 0.25 in (6 mm). Slumps shall be reported to the nearest 1/4 inch (1 mm).

101.15.4 Entrained air tests will be performed on each quality assurance sample in accordance with the requirements of ASTM C231 for normal weight concrete, and ASTM C173, light weight concrete as specified in TABLE 101.C. Concrete used for entrained air tests shall not be used in specimens for strength tests. The entrained air shall not be less than the minimum nor greater than the maximum entrained air specified plus 0.1 %. Entrained air shall be reported to the nearest one tenth of one percent.

101.15.5.1 The cement content per cubic yard for a load of concrete shall be determined on each quality assurance sample in accordance with ASTM C138. The unit weight shall be reported to the nearest one tenth of a pound per cubic foot (one kilogram per cubic meter). The cement factor shall be reported to the nearest pound per cubic yard (kilogram per cubic meter).

101.15.5.2 The portland cement content per cubic yard for a load of concrete shall be calculated by dividing the batched weight of the portland cement reported on the truck ticket for the load represented by a quality assurance test sample, by the yield, in cubic yards, determined in 101.15.1. The cement content shall be reported to nearest one pound per cubic yard. The portland cement content shall not be less than the minimum cement content for the application specified in TABLE 101.C.

101.15.5.3 The water to cementitious ratio for a load of concrete sampled and tested under this specification shall be calculated by comparing the total water in a load, by weight, the batched water reported on the load's batch ticket plus any water added in the field, to the sum of the portland cement and fly ash reported on the batch ticket. The weight of the water shall be divided by the weight of the cementitious materials and reported to the nearest one hundredth value (xx.xx). The water to cementitious ratio shall be less than or equal to the water to cementitious ratio for the application specified in TABLE 101.C.

101.15.6 A non complying field test, slump test, entrained air test, cement content, shall be verified by sampling and testing a second sample from the same load represented by the non complying sample/tests. If the second sample/tests determine the material is in compliance, the load may be authorized for placement and the all quality assurance tests required shall be performed. If the second test confirms the initial test results, the concrete load may be rejected as directed by the ENGINEER. If the second test confirms the initial sample non complying test, the second sampling and testing shall be payed by the CONTRACTOR, as specified. The OWNER shall pay for all complying test.

101.15.7.1 Quality assurance compressive strength concrete specimens/cylinders shall be molded in accordance with ASTM C31. Cylinders shall be sealed metal or plastic molds complying with ASTM C31. The specimens will be submerged in water during the initial field curing at the site when the average ambient temperature is equal or greater than 60 °F, site conditions permitting, as directed by the ENGINEER. If the initial field cure submersion procedure is not used, high-low thermometers shall

be used to monitor the initial field cure temperature of the quality assurance specimens, and the recorded temperatures shall be reported in the sampling and testing report. If the curing temperature recorded on the high-low thermometer exceeds 85 °F, concrete compressive test strengths shall be reported as information only, and the lab of record shall revise the initial cure procedure for the assurance specimens to control the curing temperature to less than 85 °F. Cylinders left in the field longer than the maximum specified time shall be so identified and reported "for information only". A sample may be taken to the testing laboratory for testing and casting provided the cylinders can be molded within 15 minutes after sampling.

101.15.7.2 Strength specimens shall be molded and tested in accordance with ASTM C31, C39, C78 & C93, C192, and this specification. The number and type of compressive strength test cylinders shall be a minimum of four (4) 6"dia. x 12"H cylinders for channel concrete, and normal concrete with nominal maximum size aggregate of 1.5 inch to 2.0 inch. The number and type of compressive strength test cvlinders shall be a minimum of four (4) 4" dia x 8" cylinders for normal concrete with nominal maximum size aggregate 1 inch and less. The number and type of cylinders shall be a minimum of six (6) 4" dia x 8" cylinders for high early release concrete compressive strength tests. The number and type of Modulus of Rupture flexure test beams shall be a minimum of three (3) 6"x6"x42" beams or equivalent for Modulus of Rupture Tests, as directed by the ENGINEER. Strength specimens shall be cast using concrete from the same load as the concrete field tests. When 4"dia. x 8" cylinders are used, they shall be cast in two equal lifts, each lift rodded twenty five times with a three eights inch (9.5 mm) diameter rod with a three eights inch (9.5 mm) semi spherical tip. The rodding of a lift placed on a lift of concrete shall penetrate into the top of the preceding lift.

101.15.7.3 When strength tests are required for stripping of forms or release of structure, a minimum of 2 test specimens complying with the specimen type specified in 101.15.7.2 for each test shall be molded and cured at the site under the same conditions as the concrete represented by the specimens. The specimens shall be returned to the Lab at the end of the field curing period and tested in accordance with ASTMC39. The test strength shall be the average of the test strengths of the two specimens. The critical concrete compressive strength (f_c) shall be a minimum of 85% of the specified design strength.

101.15.7.4 Concrete strength test specimens shall be tested at 7 days and 28 days. One specimen shall be tested at 7 days and 2 specimens shall be tested at 28 days, and reported to the Engineer. The test strength shall be the average of the test strengths of the two specimens tested at either 28 days, or as specified in the Supplemental Specifications, drawings, or by the ENGINEER.

101.15.7.5 High early release concrete strength test specimens shall be tested at 3, 7, and 28 days for concrete. One specimen shall be tested at 3 days and 2 specimens shall be tested at 7 and 28 days, and reported to the ENGINEER. The test strength for high early release concrete shall be the average of the test strengths of two specimens tested at 7 days, or as specified in the Supplemental Specifications, drawings.

101.15.8. Not Used.

101.15.9.1 Evaluation and acceptance of concrete shall meet the criteria established in Chapter 5, Section 5.6, "Evaluation and acceptance of concrete," ACI 318-89. Each strength test result shall be the average of two cylinders from the same sample tested at 28 days or the specified age. The strength level of the concrete will be considered satisfactory if the averages of all sets of three consecutive strength tests results equal or exceed the required f'c and no individual strength test result falls below the required f'c by more than 500 psi. Quality assurance compressive strength specimens sampled and cast when the average ambient temperature is greater than 60 °F, and cured with an initial field cure procedure other than submersion method specified in

101.15.7.1, shall be evaluated using the highest curing temperature recorded by the high-low thermometer provided for the field cure and Table 101.E. The test compressive strength shall be compared to the estimated strength corresponding to the highest initial cure temperature indicated in Table 101.E. An assurance compressive strength test shall be equal or greater than the compressive strength defined by Table 101.E when the initial field cure temperature is equal or greater than 85 °F and the initial field cure is not the submerged method specified in 101.15.7.1.

TABLE 101.E

MINIMUM COMPRESSIVE STRENGTH, f_C

°F [2]	73	80	85	90	95	100	105	110	115	120
Cure Day(s)	P_{TI} , % of Specified Strength, f ^r _c [1,3]									
3	100	108	114	120	122	123	125	120	115	110
7	100	101	102	103	100	98	95	91	78	75
28	100	97	95	93	90	88	85	82	78	75

f_c P_{TI} x f'_c / 100, psi

Notes: 1. Reference ACI 306, 6.6.1

2. The Non Submerged assurance cylinder cure recorded maximum initial field cure temperature. If a high-low thermometer was not used, the highest ambient temperature recorded for the initial cure period by the national weather service will be used as the initial cure temperature. 3. f_c specified compressive strength

101.15.9.2 If individual tests of either laboratory-cured specimens produce strengths more than 500 psi (3.4 MPa) below f'c, or, if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is adequate. If the presence of low-strength concrete is confirmed and computations indicate that the load-carrying capacity may have been significantly reduced, tests of cores drilled from the area in question shall be required in accordance with ASTM C42, as directed by the ENGINEER. Three cores shall be taken for each case of an individual cylinder test more than 500 psi (3.4 MPa) below f'c or where the average of any set of three consecutive strength test results is below f'c. If the

concrete in the structure will be dry under service conditions, the cores shall be air dried (temperature 60 to 80 °f and relative humidity less than 60 percent) for seven days before test and shall be tested dry. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be immersed in water for at least 48 hours and tested wet. If coring is required a coring plan will be prepared by the ENGINEER no later than 42 calendar days after the placement date. Coring shall be completed and a report submitted no later than 56 calendar days after placement. Core sampling for non complying tests shall be taken at the direction of the ENGINEER and paid by the OWNER. The CONTRACTOR shall be responsible for material replacement of the same design mix in adjacent concrete at no cost to the OWNER where samples are removed.

101.15.9.3 Concrete in the area represented by core tests shall be considered structurally adequate if the average strength of three (3) cores is equal or greater than 85% of the specified design strength (fc), and no single core has a compressive strength less than 75% of the specified design strength. To check testing accuracy, locations represented by erratic core strength may be retested. If these strength acceptance criteria are not met by the core tests, and if structural adequacy remains in doubt, The OWNER and ENGINEER may order load tests as outlined in Chapter 20, ACI 318 for the questionable portion of the structure. Load tests shall be

paid for by the CONTRACTOR.

101.15.9.4 If the structure under consideration does not satisfy the above strength acceptance criteria or the criteria of Section 20.2 or 20.4, ACI 318 The OWNER may order The CONTRACTOR to remove and replace any portion of the structure which is not in compliance with the above. If so ordered, the CONTRACTOR shall perform such work at his own expense. The CONTRACTOR shall patch all core sample holes with the same or similar materials adjacent to the core hole. The patching concrete shall be placed and cured in accordance with the requirements of this specification.

101.15.10 TEST REPORTS

101.15.10.1 Test reports shall include but not limited to the following, as directed by the ENGINEER.

- A. Field Data
 - 1 Date of Sampling
 - 2 Time of Sampling
 - 3 City of Albuquerque Project or
 - 4 City of Albuquerque project or Permit Number
 - 5 Contract Title
 - 6 Portland Cement Concrete Supplier
 - 7 Delivery Ticket Number
 - 8 Design Mix Number
 - 9 Sampling location as defined by the Project Plans and Specifications
 - 10 Ambient temperature at time of sampling, ^oF
 - 11 Material temperature at time of sampling, ^oF
 - 12 Mixer drum revolution count at start of discharge of concrete

В.	Field Tests Results, with specifications.	Accuracy	
	1 Slump, in (mm)	0.25	1
	2 Entrained Air, %	x	x.x
	3 Unit Weight, pcf (kg/m ³)	XXX.X	(xxxx)
	4 w:(c+fa) ratio	X.XX	x.xx
	5 Cement Factor, C.F., lbs/yd ³ (kg/m ³)	XXX	(xxxx)

6 Cement pay factor determined in accordance with 101.16.2

- C. Comments
 - 1 Report any addition of water and materials and amounts by either volume or weight, prior to and after sampling.
 - 2 Report mixer revolutions count at time of discharge.
 - 3 Record number of mixer revolutions after field tempering with water and/or admixtures, and @ what mixer speed, mixing or agitating speed.
- D. Laboratory Tests
 - 1 Calendar reference and day count from date of sampling for each strength test sample
 - 2 fc compressive strength test result reported to psi/ MPa1013 M.R. Modulus of rupture reported to psi/ MPa50.5

E. Analysis & Certification

The testing laboratory shall provide certification the sampling and testing were performed in compliance with the requirements of the specifications. Certification shall be provided by the New Mexico Registered Professional Engineer in direct responsible charge of the laboratory testing program.

101.15.10.2 Test results shall be reported to the ENGINEER, CONTRACTOR, concrete supplier and OWNER in writing, within 7 working days of completion of the test, as directed by the ENGINEER. Non-complying tests shall be reported within one working day of completion of the test.

101.16 MEASUREMENT AND PAYMENT

101.16.1 Measurement for Portland cement concrete supplied under this specification shall be by LOTS as the area, volumes, and as specified in the contract documents, as directed by the ENGINEER.

101.16.2 Payment for Portland cement concrete supplied under this specification shall be for each LOT, at the contract unit price adjusted in accordance with the

formula below and TABLE 101.F, as directed by the ENGINEER. A LOT shall be defined as either the volume or area of concrete for each design mix placed on a project in a day as defined in the CONTRACT. The adjusted unit price shall be calculated using the formula below and the pay factor, CF_P, defined in TABLE 101.F. The pay factor shall be defined by the number of samples representing a LOT, and, the % variance of the mean/average (M) portland cement content of the LOT from the minimum cement content specified in TABLE 101.C for the application, as determined by field quality assurance sample test results. Acceptance samples for a LOT shall be sampled and tested in accordance with 101.15. All acceptance samples taken in one day for a type of concrete shall represent a LOT of that type of concrete.

UP' = PF X UP UP', Adjusted Contract Unit Price PF, Pay Factor , PF= $0.50 \times (1.00 + CF_P)$ UP, Contracted Unit Price

n, number of samples	Deficiency, $D = (C - M)/C$	CF _P
3, OR MORE	D 0.0	1.00
	0.0 < D 1.0	1.00
	1.0 < D 2.0	0.95
	4.0 < D 6.0	0.90
	6.0 < D 8.0	0.85
	8.0 < D 10.0	[1]
	D > 10.0	Remove and Replace

TABLE 101.F - CEMENT PAY FACTOR CALCULATION, CFP

D, Deficient cement content as % of C, minimum

C, Minimum cement content specified for the application in TABLE 101.C

M, Average or mean (M) cement factor for a LOT. The cement factor shall be calculated as the average of cement factors of all tests taken for a LOT, but not less than three tests, determined in accordance with 101.15.6.

[1] If determined by the ENGINEER to be more practical to accept the material, the LOT may be accepted under written agreement between the OWNER and the CONTRACTOR at an assigned pay factor CFp= 0.70.

STEEL REINFORCEMENT

102.1 GENERAL

The following specifications set forth the requirements for bar reinforcement, wire reinforcement, and wire mesh reinforcement. The reinforcement shall conform accurately to the dimensions and details indicated on the plans or otherwise prescribed; and before being placed in any concrete work shall be cleaned of all rust, mill scale, mortar, oil, dirt, or coating of any character which would be likely to destroy, reduce, or impair its proper bonding with the concrete. No reinforcing steel will be accepted under this specification until it has been approved by the ENGINEER as conforming with requirements prescribed therefor. When required by the ENGINEER, the CONTRACTOR or vendor shall furnish samples thereof for testing and notify the ENGINEER as to when and where they will Such samples shall be be available. expense furnished at the of the CONTRACTOR or vendor, but the cost of any testing that may be required will be borne by the OWNER. Samples shall only be taken in the presence of the ENGINEER. The CONTRACTOR shall furnish a certificate mill test report for each heat or size of steel when required by the ENGINEER.

102.2 REFERENCES

102.2.1 ASTM

A 82	A 615
A 185	A 616

102.2.2 ACI

318

102.3 BAR REINFORCEMENT

102.3.1 Reinforcing steel bars shall be deformed intermediate grade billet steel conforming with ASTM A 615. Rail steel conforming with ASTM A 616 may be permitted by the ENGINEER. The Grade shall be 40 or 60, unless Grade 60 is specified on the standard detail drawings or on the construction plans.

102.3.2 In testing bar reinforcement, only the theoretical cross-sectional area will be used in all computations.

102.3.3 Bending of steel will conform to requirements of ACI 318. The various grades of steel shall not be used interchangeably in structures. If rail steel is used, shop and field bending shall comply with the following provisions:

102.3.3.1 Continuous and uniform application of force throughout the duration of the bending operation.

102.3.3.2 Unrestricted movement of the bar at points of contact with the apparatus.

102.3.3.3 Close wrapping of the specimen around the pin or mandrel during the bending operations.

102.3.4 Bending or straightening of reinforcing steel shall be accomplished in such a manner and by such means as to insure that no damage to the material will result as a consequence thereof. Bars shall not be heated to perform bending of bars. Kinked bars shall not be used.

102.3.5 Cutting reinforcement steel or wire by means of a cutting torch is prohibited.

102.3.6 Welding of reinforcing steel or wire is prohibited.

102.4 WIRE REINFORCEMENT

Wire reinforcement shall, in all respect, fulfill requirements prescribed in ASTM A 82.

102.5 WIRE MESH REINFORCEMENT

Mesh reinforcements shall conform to ASTM A 185. The gauge of the wire and the dimensions of the mesh will be specified in the Supplementary Specifications or shown on the plans. The wire mesh reinforcement shall be so constructed as to retain its original shape and form during the necessary handling. The effective cross- sectional area of the metal shall be equal to that specified or indicated on the plans.

102.6 WIRE TIES

Wire for ties shall be black, annealed, not lighter than 16 gauge.

102.7 CHAIRS

Chairs used for support or spacer of reinforcement shall be approved by the ENGINEER.

102.8 MEASUREMENT AND PAYMENT

Steel reinforcement will be included in the measurement for reinforced concrete per cubic yard or square yard in place, unless otherwise stipulated in the Bid Proposal. Payment will be made at the unit price per cubic yard or square yard as defined in the bid proposal.

PLASTIC PIPE

121.1 GENERAL: Plastic pipe for pressure and non-pressure uses shall be manufactured from polyvinyl chloride (PVC), high-density polyethylene (HDPE) or ultra-high molecular weight materials.

121.2 REFERENCES.

- 121.2.1 American Society for Testing and Materials (Latest Editions) (ASTM):
- D1248 Specification for Polyethylene Plastics Molding and Extrusion Materials
- D1598 Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
- D1599 Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings
- D1601 Test Method for Dilute Solution Viscosity of Ethylene Polymers
- D1693 Test Method for Environmental Stress -Cracking of Ethylene Plastics
- D1784 Specifications for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- D2239 Specifications for Polyethylene (PE) Plastic Pipe(SIDR-PR) Based on Controlled Inside Diameter
- D2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- D2657 Heat-Joining Polyolefin Pipe and Fittings
- D2737 Specification for Polyethylene (PE) Plastic Tubing
- D3034 Specification for type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- F477 Specification for Elastomeric Seals (Gaskets) for joining Plastic Pipe
- F679 Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
- F794 Specification for Poly (Vinyl Chloride) (PVC) Large Diameter Ribbed Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
- F894 Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
- 121.2.2 American Water Works Association (Latest Edition (AWWA):
- C900 AWWA Standards for Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in. for Water.
- C905 AWWA Standard for Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameter 14 in through 36 in.
- C909 Molecular Oriented Polyvinyl Chloride (PVCO)

Pressure Pipe 4 in. through 12 in. for Water Distribution

- 121.2.3 THIS PUBLICATION:
 - SECTION 800 WATER TRANSMISSION, COLLECTOR DISTRIBUTION AND SERVICE LINES
 - SECTION 900 SANITARY AND STORM SEWER FACILITIES.

SECTION 1502 SUBMITTALS

121.3 CERTIFICATION: The CONTRACTOR shall submit certification from the manufacturer of the pipe as specified in Section 1502 as to the pipe material and that the pipe meets or exceeds the required testing. Only pipe manufactured in the United States of America will be acceptable.

121.4 GENERAL PLASTIC PIPE REQUIREMENTS

121.4.1 POSITIVE IDENTIFICATION: All plastic pipe shall be coded in accordance with the applicable material standard to eliminate future confusion and prevention accidental damage and service interruption of the facilities.

121.4.2 LINE LOCATOR: Metallic tape shall be used as a locator for all plastic pipe which is installed less then 10 feet deep. The tape should be installed 3 ft. to 6 ft. below top of ground and centered over the pipe. When feasible, the tape shall be fastened to metallic appurtenances associated with the installation (i.e. valves, fittings, manhole rings, etc.) in an effort to enhance its detectability.

121.4.3 PIPE STORAGE: All types of plastic pipe shall be stored in a manner that the pipe will not be deformed as recommended by the manufacturer. PVC or PVCO pipe is subject to potential degradation when exposed to prolonged periods of sunlight. Material degradation is generally indicated by a discoloration of the pipe. PVC or PVCO pipe shall be stored inside a building, under a cover or covered up totally. All discolored pipe shall not be installed and shall be immediately removed form the project.

121.4.4 JOINING SYSTEMS

121.4.4.1 All plastic pipe which is connected to a manhole, junction box, inlet or similar structure shall be installed with an approved manhole connection adapter

or water-stop such that each connection is leak-free and that there is no detrimental affect resulting from the material property characteristic differences between the plastic pipe and the structure.

121.4.4.2 Bell and Spigot Joints: Pipe with gasket joints shall be manufactured with a socket configuration, which will prevent improper installation of the gasket and will ensure that the gasket remains in place during joining operations. The gasket shall be manufactured from a synthetic elastomer material and shall conform with the requirements of ASTM F 477. The spigot end of each joint of pipe shall be marked circumferentially to indicate the proper home mark. Pipe, which is field- cut, shall be chamfered and the home mark identified in accordance with the applicable criteria.

121.4.4.3 Heat-Welded Joints: HDPE pipe, which is manufactured without the standard bell and spigot joint configuration shall be joined by a heated fusion process in accordance with ASTM D 2657.

121.5 MATERIALS AND UTILIZATION.

121.5.1 Polyvinyl Chloride (PVC) and Molecular Oriented Polyvinyl Chloride (PVCO) Pressure Pipe:

121.5.1.1 The material in PVC and PVCO pipe shall be in accordance with ASTM D 1784. Also, the material in PVCO pipe shall be in accordance with Molecular Oriented and Polyvinyl Chloride.

121.5.1.2 Pipe shall be suitable for use in the conveyance of water for human consumption. The pipe shall be marked with two seals of the testing agency that certified the pipe material is suitable for potable water use.

121.5.1.3 PVC and PVCO pipe shall be approved by the Underwriters Laboratories (UL) and be furnished in cast iron pipe-equivalent outside diameters. Joints shall be push-on flexible elastomeric gasketed.

121.5.1.4 Pressure pipe shall have a minimum working pressure of 150 psi (DR 18) or as specified on the plans or in the Supplemental Technical Specifications.

121.5.1.5 Pipe lengths shall contain one bell-end or couple with an elastomeric gasket. Gasket shall meet the requirements of ASTM F 477. The bell shall be an integral part of the pipe length and have the same strength and DR as the pipe. The spigot pipe end shall be beveled.

121.5.1.6 PVC pressure pipe in sizes 4-inch through 12-inch shall meet the requirements of AWWA C 900. PVCO pressure pipe in sizes 4-inch through 12 inch shall meet the requirements of AWWA C 909. 121.5.1.7 PVC pressure pipe in sizes 14-inch through 24-inch shall meet the requirements of AWWA C 905.

121.5.2 Polyvinyl Chloride (PVC) Gravity Flow Pipe:

121.5.2.1 The material in PVC pipe shall be in accordance with ASTM D 1784.

121.5.2.2 PVC gravity flow pipe may be used for sanitary sewer and storm drainage applications for sizes 8-inch and greater, except for installation resulting in a depth of cover (to subgrade elevation) less than 3.1 feet or when the Contract documents specifically prohibit its use.

121.5.2.3 Lateral line connections shall be made at manholes or at factory manufactured saddles or tees only, unless specifically authorized by the ENGINEER.

121.5.2.4 PVC gravity flow pipe in sizes 8-inches through 15-inches shall meet the requirements of ASTM D 3034. Only solid wall pipe shall be used. Minimum wall classification shall be SDR 35.

121.5.2.5 PVC gravity flow pipe in sizes 18-inch and larger shall meet the requirements of ASTM F 679 or ASTM F 794. Minimum pipe stiffness shall be 46 psi.

121.5.2.5.1 Sewer service line connections to this pipe will not be permitted, unless specifically authorized in the plans and/or Supplemental Technical Specifications and/or by the ENGINEER.

121.5.3 Polyethylene (PE) Pipe:

121.5.3.1 The material in PE pipe shall be in accordance with ASTM D 1248.

121.5.3.2 High Density Polyethylene (HDPE) Profile Wall Gravity Flow Pipe:

121.5.3.2.1 High-density polyethylene (HDPE), large diameter, profile wall, gravity flow pipe shall meet all general requirements for plastic pipe and shall conform to requirements in ASTM F 894 for diameters of 30-inch and larger.

121.5.3.2.2 Minimum wall thickness in pipe waterway shall be RSC 63. When using ASTM D 2412 for determining the strength value of pipe, the E' number (E = modulus of soil reaction) shall not exceed 1500 psi. The pipe manufacturer shall provide certification to the CONTRACTOR and ENGINEER that the class of pipe used is adequate for the specific pipe laying conditions, including, but not limited to, depth of bury, soil characteristics and groundwater conditions.

121.5.3.2.3 Sewer service line connections to this pipe will not be permitted, unless specifically authorized in the

plans and/or Supplemental Technical Specifications and/or by the ENGINEER.

121.5.3.2.4 Lateral line connections shall be made at manholes or at factory manufactured tees or saddles only, unless specifically authorized by the Engineer.

121.5.3.3 All water service lines shall be copper per these specifications.

121.6 MEASUREMENT AND PAYMENT: Plastic pipe used for both pressure and gravity flow shall be measured and paid for at the contract unit pipe as specified in Section 800 and 900 and/or as defined in the Bid Proposal.

DUCTILE IRON PIPE

129.1 GENERAL

Ductile iron pipe is acceptable for use in the installation of water lines for sizes 4 inches to 64 inches. Ductile iron pipe shall only be used for sanitary sewers where specifically required by the plans *or* authorized by the ENGINEER. The size and thickness class for ductile iron pipe shall be as specified herein or on the plans.

129.2 REFERENCES

129.2.1 ASTM:

A 674 A 746

129.2.2 AWWA:

C 104		C 105
C 111	C 115	
C 150	C 151	
C 600		

129.2.3 This Publication

Section	130
Section	801
Section	900

129.3.1 The ENGINEER shall determine the required class of ductile iron pipe based on the laying condition, depth of cover and loading factors in accordance with AWWA C 150 but in no case shall the ductile iron pipe be less than pressure class 150. If a pressure class higher than 150 is required, it will be specified on the plans or in the Supplemental Technical Specifications.

129.3.2 Ductile iron pipe shall be manufactured in accordance with AWWA C 151 and shall be cement mortar lined with a bituminous seal coat in accordance with AWWA C 104.

129.3.3 Ductile iron pipe joints for underground installations shall be rubbergasketed push-on, *or* mechanical type in accordance with AWWA C 111. 129.3.4 Where specified on the construction drawings, the ductile iron flanged joint pipe shall meet the requirements in AWWA C 115. Flanged joints shall only be utilized in above ground installations or within structures, such as: valve pits or vaults.

129.3.5 Ductile iron pipe connections to fittings shall be as specified in Section130.

129.3.5 Ductile iron pipe connections to fittings shall be as specified in Section 130.

129.3.6 Ductile iron pipe shall be installed in accordance with AWWA C 600 and Section 801. When specified or authorized by the ENGINEER, polyethylene encasement shall be installed and shall conform to AWWA C 105.

129.4 DUCTILE IRON SANITARY SEWER PIPE

129.4.1 Ductile iron pipe, utilized for sanitary sewer installation, shall be asphaltic lined in accordance with ASTM A 746, unless otherwise specified on the plans or in the Supplemental Technical Specifications.

129.4.2 All pipes shall be a minimum of pressure class 150.

129.4.3 When specified or authorized by the ENGINEER, polyethylene encasement shall be installed in accordance with ASTM A 674.

129.5 MEASUREMENT AND PAYMENT

Ductile Iron pipe with or without polyethylene encasement for both pressure and gravity flow shall be measured and paid for at the contract unit price as specified in Section 801 and 900 and/or as defined in the Bid Proposal.

SUBGRADE PREPARATION

301 GENERAL

301.1 The work performed under this specification shall include. but not be limited to providing the equipment. labor and materials for the preparation of soil subgrade and maintenance of the prepared subgrade for the construction of graded aggregate base, asphalt treated base, cement treated base, asphalt concrete, Portland cement concrete, sidewalks, curb and gutter. drive pads, valley gutter, median pavements and/or any other roadway improvements.

301.2 REFERENCES

301.2.1 ASTM:

C136	D423
D424	D698
D1140	D1557
D2844	D2922
D3017	

301.2.2 This publication

Section 204

301.3 MATERIAL

301.3.1 Subgrade material may be on site soil, combinations of pulverized asphalt concrete and soil, and/or pulverized Portland cement concrete and soil, imported soils, complying with the requirements of this specification. Flowing, sugar sands shall not be used for subgrade material.

301.3.2 All soft and unstable material and other portions of the subgrade which will not compact readily or serve the intended purposes shall be removed and replaced with suitable material from excavation or borrow or suitable materials shall be added and. by manipulations, be incorporated into the subgrade to produce a material meeting subgrade requirements.

301.3.3 All subgrade material shall have a minimum Resistance Value (R-Value), as determined by ASTM D-2844, equal to or greater than the design R-Value for the pavement section. If the subgrade soils encountered during construction have a R-Value less than the design R-Value, those subgrade materials shall be removed to a depth of not less than two (2') feet below the finished subgrade elevation or as authorized by the ENGINEER and to the horizontal limits authorized by the ENGINEER, and replaced with subgrade material having an R-Value greater than the design R-Value. On small projects, in areas that just involve replacement of existing roadway items or when no design R-Value has been established this R-Valve requirement may be waived if authorized by the ENGINEER.

301.4 SUBGRADE COMPACTION

301.4.1 Subgrade preparation shall extend to one foot (1') beyond the limits of the improvement to be placed on the subgrade except when that improvement abuts an existing structure and/or the limits of the right of way. Where an improvement abuts an existing structure and/or the limits of right of way, the subgrade preparation shall extend to the edge of the existing structure and/or the limits of right of way, as specified in the plans, specifications. supplemental technical specifications or as directed by the ENGINEER. Where existing structures are in the right of way or construction easements, subgrade preparation shall extend to the face of the structure, as specified above. Subgrade preparation shall not extend below the bottom of the foundation of an existing structure without specific authorization by the ENGINEER.

301.4.1.1 Subgrade preparation for roadway improvements shall be performed after completion of earthwork construction, subsurface utility installation and trenching back fill within the limits specified, as directed by the ENGINEER. The subgrade preparation shall extend the full width of the roadway to either one (1) foot back of new curb and gutter, and/or to the face of existing structures. and or the limits of right of way, as specified in the plans and specifications. as directed by the ENGINEER.

301.4.1.2 Subgrade preparation for sidewalks and drive pads shall extend a minimum of one (1') beyond the free edge of the improvement, and/or to the limits of right of way, and/or to the face of existing structures.

301.4.1.-3 The subgrade preparation for roadway construction without curb and gutter, shall extend one (1 ') beyond the edge of the pavement, and/or to the face of existing structures, and/or to the limits of right of way, as specified in the plans and specifications, as authorized by the ENGINEER.

301.4.1.4 Subgrade preparation shall extend the full width of roadway medians four (4) feet wide or less.

In areas that the medians are wider than four feet (4') the subgrade compaction shall extend one foot (1') beyond the median edge of the pavement or back of the median curb.

301.4.2. The subgrade for arterial/collector roadway shall be ripped to a minimum depth of one (1) foot, brought to uniform moisture content, and compacted to the requirements of plans and specification, as authorized by the ENGINEER. Subgrade material with either 20 per cent or more material passing a no. 200 sieve sha11 be uniformly mixed and moisture conditioned using a tractor mounted mixer or disced after ripping, as specified in the plans and specifications, as authorized by the ENGINEER. The subgrade for reconstructed curb and gutter, sidewa1ks, drive pads, residential roadways, bicycle paths and other roadways shall be scarified to a minimum depth of six (6) inches, brought to uniform compaction moisture content, and compacted to the requirements of plans and specification, as authorized by the ENGINEER.

301.4.3 Subgrade area shall be compacted to a dry density greater than 95 per cent of maximum dry density in a moisture range of optimum moisture +/-2% as determined in accordance with ASTM D1557, unless the material contains 35% or more material finer than the No.200 sieve. If the subgrade material has 35% or more material finer than the No.200 sieve, the subgrade shall be compacted to a dry density greater than 95 percent of maximum dry density in a moisture content range of at least optimum moisture to optimum moisture +4%, as determined in accordance with ASTM D698.

301.4.4 Areas on which roadway pavement items are to be placed shall be compacted uniformly to the required subgrade density at the same time. Obtaining the required subgrade density in trench areas at a different time than obtaining the required subgrade density in the adjacent pavement areas will not be permitted. 301.4.5 Upon completion of the subgrade preparation, the CONTRACTOR shall maintain the compacted subgrade density and moisture content at the specified levels until the next lift of material is completed. The CONTRACTOR shall provide continuous moisture protection of the subgrade by either sprinkling or the application of a prime coat, as directed by the ENGINEER.

301.5 SUBGRADE TOLERANCES

Subgrade upon which pavement, sidewalk, curb and gutter, drive pads, or other structures are to be placed shall not vary more than +1/4 inch or -1/2 inch per 10 foot in any direction from the specified grade and cross section. Subgrade upon which base material is to be placed shall not vary more than +1/2 inch or -1 inch per 20 foot in any direction from the specified grade and cross section. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met.

301.6 TESTING:

301.6.1 A sample of each type of soil encountered shall be classified in accordance with the requirements of ASTM D2487, the moisture density relationship determined in accordance either ASTM D698 or D1557, whichever is applicable and an estimated resistance R-value assigned based on plasticity index, PI, and percent material passing the No.200 sieve.

301.6.2 Compaction tests shall be taken for each 500 sy or less, as directed by the ENGINEER. Compaction tests shall be taken in accordance with ASTM D2922 and D3017. Areas represented by non complying tests shall be reworked as specified, and retested for compliance.

301.6.3 Test reports shall include but not be limited to the requirements of TABLE 301.A.

TABLE 301.A TEST REPORT INFORMATION

A. Field Data

Date of Sampling/Field Test Project Number or Permit Number Project Title Location of sample/field test as defined by the project plans and specifications Time of Sampling/field testing Field test results with reference specification limits

B. Laboratory Data

Soil classification Soil gradation Plasticity index Liquid limit Optimum moisture/maximum dry density relationship and graph Estimated soil resistance R-Value

301.6.4 Test results shall be reported to the ENGINEER and CONTRACTOR in writing, within 4 working days of completion of the sampling and or field test. Non-complying test shall be reported within 1 working day of completion of the test.

301.7 MEASUREMENT AND PAYMENT:

301.7.1 Measurement for payment of roadway subgrade preparation will be by the square yard to the limits of the surfacing, as authorized by the ENGINEER. Payment for subgrade preparation shall include all labor and equipment required to shape, mix, add moisture, compact, bring to grade and maintaining the prepared subgrade moisture and density until the next course of material is placed.

301.7.2 The measurement of payment for subgrade preparation for non-pavement roadway items such as curb and gutter, valley gutter, drive pads and sidewalks etc., shall be included in that item. No separate payment will be made.

AGGREGATE BASE COURSE CONSTRUCTION

302.1 GENERAL

The work provided under this specification shall include the furnishing, placement and compaction of aggregate base course (ABC) to the lines, grades, dimensions, moisture, density and typical sections as specified in the plans and specifications, and or as directed by the ENGINEER. The CONTRACTOR shall be solely responsible for the aggregate base course either batched at and/or delivered to the site. A job mix formula for aggregate base course, shall be certified in accordance with the of these specifications. Each job mix formula submitted and authorized for use under this specification shall be identified by a number, unique to that job mix formula and aggregate production plant/pit. If a change in material(s) from that specified in the job mix formula occur during a project, the CONTRACTOR shall submit a new job mix have formula to include the changed materials for approval by the ENGINEER. A job mix formula shall not be used on a project without written approval of the ENGINEER. A job mix formula, upon request by an aggregate supplier, may be authorized by the OWNER for a period of 14 months, from the date of sampling of aggregates used in the job mix formula.

302.2 REFERENCES

302.2.1 ASTM:

C136	D75
D422	D423
D424	D1557
D2419	D2844
D2922	D2940
D3017	

302.2.2 This Publication:

Section	113
Section	301

302.3 MATERIALS

302.3.1.1 Aggregate base course shall be coarse aggregate of either crushed stone, or crushed gravel, or crushed asphalt concrete, or crushed Portland cement concrete, or any combination, and natural sand, the combination of materials conforming to the requirements of ASTM D2940 and the plans and specifications, as authorized by the ENGINEER.

302.3.1.2 Coarse aggregates retained on the No.4 sieve shall consists of durable particles of either

crushed gravel, or crushed asphalt concrete pavement, or crushed portland cement concrete, or any combination, capable of withstanding the effects of handling, spreading and compacting without degradation production of deleterious fines. At least 50% of the particles retained on the 3/8-inch sieve, shall have two or more fractured faces. Coarse aggregate shall comply with the requirements of TABLE 302.A.

302.3.1.3 Fine aggregate passing the No.4 sieve shall consists of fines from the operation of crushing coarse aggregate; where available and suitable, natural sand or finer mineral matter or both, may be added. Fine aggregate shall comply with the requirements of TABLE 302.A.

302.3.1.4 The job mix formula and gradation shall comply with the requirements of TABLE 302.B, and have the same or similar characteristic gradation curve as either range limit, when graphically plotted on a standard "0.45 POWER" Gradation Chart.

302.3.1.5 Aggregate base course furnished and placed under this specification shall have a resistance value, (R-Value), not less than 76 as determined by ASTM D2844.

302.3.1.6 A job mix formula, certified by a Registered New Mexico Professional Engineer to comply with the requirements of this specification, shall be submitted to and authorized for use by the ENGINEER before the material may be incorporated in the construction. A submittal shall include, but not be limited to, the items in TABLE 302.C. Prior to delivery of the material, the CONTRACTOR may be required to furnish samples of the aggregates base course to the ENGINEER for testing. Gradations for the aggregate base course used in a particular day's placement shall be submitted to the ENGINEER upon request.

302.3.2 Prime coat for surface sealing of compacted aggregate base course shall comply with the requirements of CSS-1H Cationic Emulsified Asphalt as specified in Section 113.

302.4 TRANSPORTATION AND PLACEMENT

302.4.1 Aggregate base course shall be transported in suitable vehicles with a cover. A load shall be covered immediately after loading and remain covered until unloading.

302.4.2 The CONTRACTOR shall provide to the ENGINEER with each load of batched and/or delivered to the job site, before unloading at the site. a copy of the delivery ticket on which is printed, stamped or written. the information defined in TABLE 302.D.

302.4.3 Aggregate base course shall be placed on prepared subgrade, prepared in accordance with the requirements of SECTION 301, the plans and specifications, and or as directed by the ENGINEER.

302.4.4 Aggregate base course shall be placed in lifts which will provide not less than four (4) inches and not more than 6 inches compacted thickness. The material shall be moisture conditioned within a range of optimum moisture plus or minus two percent (+/-2%), and compacted to a dry density greater than ninety-five (95) percent of maximum dry density as determined in accordance under the procedures specified in ASTM D1557.

302.4.5 The finish surface of the compacted aggregate base course shall not deviate from finish grade in excess of 1/2 inch in 10 feet when tested with a 10-feet straight edge in any direction. All deviations in excess of the specified shall be corrected by the CONTRACTOR prior to authorization for placement of the next life of material.

302.4.6 Immediately upon completion of compaction, the CONTRACTOR shall seal the surface of the compacted aggregate base course with a prime coat. The prime coat shall be applied as required to provide a uniform coverage of the surface. Application shall be between 0.05 and 0.15 gallons per square yard of surface. If final surfacing is to be placed within twenty four (24) hours after completion of compaction, the prime coat may be waived as authorized by the ENGINEER. The surface shall be kept at compaction moisture until the final surfacing is placed in the event the prime coat is waived.

302.4.7 Traffic on compacted aggregate base course shall be limited to moisture control application and final surfacing traffic only, as authorized by the ENGINEER.

302.5 TESTING

302.5.1 A sample of material delivered to the project shall be taken for each 300 tons placed or each days placement, whichever is greater, and tested for gradation and moisture density relationship. The average value of individual gradation tests, for all sieve size determinations, shall comply with the job mix formula within the tolerances specified in TABLE 302.B. Individual sample gradation test results, for all sieve size determinations, shall comply with the tolerance range plus two (2) percent. Non complying material shall be re-sampled and tested for compliance. Material not in compliance after the initial and follow up testing shall be removed and replaced by the CONTRACTOR at no cost to the OWNER, as directed by the ENGINEER.

302.5.2 Compaction tests shall be taken at the rate of one test for each 500 sy/lift placed, or as directed by the ENGINEER, in accordance with the requirements of ASTM D 2922 and D 3017. Areas represented by non complying tests shall be reworked and retested for compliance.

302.5.4 Test reports shall include but not be limited to the requirements of TABLE 302.E.

302.5.5 Test Results shall be reported to the ENGINEER, CONTRACTOR, and OWNER in writing, within 4 working days of completion of the sampling and or field test. Non-complying test shall be reported within 1 working day of completion of the test.

302.6 MEASUREMENT AND PAYMENT

302.6.1 Measurement of aggregate base course shall be by the square yard per each thickness required, complete in place.

302.6.2 Payment shall be at the contract unit price per square yard per each thickness required, complete in place which shall include all material, labor and equipment required in placing, grading and compacting the aggregate base course.

Table 302.A **ENGINEERING REQUIREMENTS**

CHARACTERISTIC	SPECIFICATION LIMIT(S)	
Aggregate Type	Fine	Course
Los Angeles Abrasion Wear (ASTM C 131)		40% max.
Soundness (5 cycles ASTM C 88)	15% max.	15% max.
Crushed Aggregate (% Material Retained on 3/8inch		50% max.
sieve by wt., having at least two (2) fractured faces)		
Maximum % passing No. 200	60% of -No.30	
Plasticity Index (Material finer than No.40 sieve)	4.0 max.	
Sand Equivalent Value	35 min.	

TABLE 302.B **GRADATION RANGES AND TOLERANCES**

	PRODUCTION RA	NGE (% passing)	PRODUCTION TOLERANCES (+/-%)
SIEVE SIZE/TYPE	I	II	
1-1/2 inch	100	100	
1 inch	95-100	100	
¾ inch		90-100	8
1/2 inch	64-75		8
3/8 inch		65-80	8
No.4	35-46	48-55	8
No.30	12-18	18-25	5
No.200	5-12	6-15	3

TABLE 302.C SUBMITTAL REQUIREMENTS

pp	lier
	pp

Β. Date

- Design Mix Identification Number С.
- D. Contractor
- E.
- Construction project number Construction Project Title (contract) F.
- Certification of compliance G.
- Target Gradation of Material Η.
- Optimum moisture and maximum dry density relationship of Ι. material and graph

The submittal shall be rejected without review if the specified data is not included.

TABLE 302.D DELIVERY TICKET INFORMATION

- A. Name of Supplier
- B. Date of Delivery
- C. Delivery Ticket Number
- D. Name of Contractor
- E. Project Name (optional)
- F. Job mix formula identification number
- G. Weight of load
- H. Time loaded

TABLE 302.E TEST REPORT INFORMATION

A. Field Data

Date of Sampling/Field Test Project Number or Permit Number Project Title Location of sample/field test as defined by the project plans and specifications Time of Sampling/field testing Field test results with reference specification limits

B. Laboratory Data

Base course classification Gradation Plasticity index Liquid limit Optimum moisture/maximum dry density relationship and graph Estimated soil resistance R-Value

PORTLAND CEMENT CONCRETE CURBS, GUTTERS, WALKS, DRIVEWAYS, ALLEY INTERSECTIONS, SLOPE PAVING, AND MEDIAN PAVING

340.1 GENERAL:

340.1.1 Portland cement concrete curbs, walks, gutters, cross gutters, valley gutters, driveways, alley intersections, slope paving and median paving constructed of concrete having a minimum compressive strength as specified in Section 101, unless otherwise noted on the plans or specified in the Supplementary Technical Specifications.

340.1.2 Subgrade preparation for concrete curbs, gutters, walks, driveways, alleys, intersections, and slope paving conform to the requirements of Section 301, unless otherwise noted on the plans or specified in the Supplementary Technical Specifications.

340.1.3 Unless otherwise specified or indicated on the plans and except as otherwise prescribed in Subsection 340.8, the minimum thickness of walks shall be 4 inches. The minimum thickness of gutters, driveway aprons, and alley intersections shall be 6 inches unless otherwise shown on the plans. The height and thickness of the curb section including other details of construction for items in Section 340 will be shown on the plans, or Standard Detail Drawings.

340.2 REFERENCES:

- 340.2.1 American Society for Testing and Materials (Latest Edition) (ASTM):
- D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
- 340.2.2 This Publication:

SECTION 101 PORTLAND CEMENT CONCRETE SECTION 102 STEEL REINFORCEMENT SECTION 105 CONCRETE CURING COMPOUND SECTION 107 JOINT FILLER AND SEALANT MATERIAL SECTION 301 SUBGRADE PREPARATION SECTION 337 PORTLAND CEMENT CONCRETE PAVEMENT SECTION 349 CONCRETE CURING

340.3 FORMS:

340.3.1 Form material shall be free from warp, with smooth and straight upper edges and, if used for the face of curb, shall be surfaced on the side against which the concrete is to be placed. Timber forms may be used for forming curved sections but shall not be

used for straight work unless authorized in writing by the ENGINEER. Metal forms for such work being of a gauge that will provide proper rigidity and strength for the purpose for which they are intended. Wood forms used on curb returns shall be not less than 3/4 of an inch in thickness, cut in the length and radius as shown on the plans and held rigidly in place by the use of metal stakes and clamps. The curb face forms shall be cut to conform exactly with the curb face batter, as well as being cut to the required length and radius. In every case, however, the forms shall be of sufficient rigidity and strength and shall be so supported as to adequately resist springing or deflection as a consequence of the placing and consolidation of the concrete.

340.3.2 All formed curb and combined curb and gutter shall be divided into blocks or stones in lengths not to exceed 12 feet long using metal templates' not less than 1/16 inch thick cut to the same cross section as the curb or curb and gutter being constructed. Templates shall be securely attached to forms to prevent movement during concrete placement.

340.3.3 Form material shall be thoroughly clean at the time it is used and shall be given a coating of light oil or other suitable material immediately prior to the placing of the concrete.

340.3.4 Forms, except curb back planks, shall be set with the upper edges thereof flush with the specified grade of the finished surface of the adjacent portion of the work and shall be not less than a depth equivalent to the full specified depth of thickness of the concrete to be supported thereby.

340.3.5 Back forms shall be held securely in place by means of stakes driven in pairs, one at the front form and one at the back, at intervals not to exceed 4 feet; clamps, spreaders, and braces being used in connection therewith to such extent as may be necessary to insure proper rigidity of the forms. Forms for walks, gutters, and similar work shall be firmly secured by means of stakes driven flush with the upper edge of the forms at intervals not to exceed 5 feet. The stakes shall be of sufficient size and shall be so driven as to properly and adequately support the forms.

340.3.6 Form clamps, specifically designed and manufactured for the curb and gutter to be constructed, may be used if, in the opinion of the ENGINEER, they fulfill the requirements above specified for curb and gutter forms.

340.4 PLACING CONCRETE:

340.4.1 The concrete shall be placed on a thoroughly dampened subgrade sufficiently moist to insure that no moisture will be absorbed from the fresh concrete.

340.4.2 Surfaces of structures in sidewalks, curbs, and gutters shall be adjusted as necessary prior to placing of concrete to meet the contiguous sidewalk surfaces.

340.4.3 Concrete shall be placed in horizontal layers not to exceed 6 inches each in thickness, each layer being spaded along the forms and thoroughly consolidated. However, if the section is more than 6 inches in depth, the concrete may be placed to provide the thickness shown or specified, if mechanical internal vibrators are used or if, in the opinion of the ENGINEER, the spading and tamping is sufficient to consolidate the concrete for its entire depth.

340.4.4 After the concrete has been placed between the side forms, a strike off shall be used to bring the surface to the proper section to be compacted. It shall then be spaded along the form faces.

340.4.5 After the concrete has been placed and consolidated, the upper surface shall be struck off uniformly smooth and true to the specified grade.

340.5 EXPANSION JOINTS:

340.5.1 Expansion joints shall be constructed in curbs, walks, and gutters as hereinafter specified, being filled with premolded joint filler strips conforming with the requirements prescribed therefor in Section 107. No such joints shall, however, be constructed in cross gutters, alleys, intersections, or driveway aprons.

340.5.2 Spacing: Unless otherwise shown on the plans or authorized by the ENGINEER, the location and spacing of expansion joints shall be as specified in the Standard Detail Drawings and herein.

340.5.2.1 Expansion joints in all types of curb and gutters shall be placed at both ends of returns except where cross gutters are being constructed, and at regular intervals not to exceed 200 feet between expansion joints. Expansion joints shall be placed at both ends of the cross gutter transitions.

340.5.2.2 Expansion joints in all types of sidewalk shall be placed where the sidewalk abuts Wheel Chair Ramps and drivepads; at regular intervals not exceeding 18 feet between expansion joints; between the walk and any building or structure; around utility pads and light foundations; and between the walk and water meter areas.

340.5.2.3 Expansion joints at wheel chair ramps and

drivepads shall be placed between these items of work and the back of the curb and gutters and the adjoining sidewalks.

340.5.2.4 Expansion joint filler strips shall be vertical and shall extend to the full depth and width of the work in which they are installed, being constructed at right angles or radially to the line of the curb or gutter as the case may be. The filler strips shall completely fill these joints at least to within 1/4 of an inch of any surface of the concrete that will be exposed upon completion of the work and must fully extend at least to those surfaces that will not be exposed. However, before the work will be accepted, any joint filler that protrudes beyond a surface that will not be exposed or beyond 1/4 of an inch below a surface that is exposed shall be trimmed off to the specified dimension in a neat and workmanlike manner. During the placing and consolidation of the concrete, the filler strip shall be held rigidly and securely in proper position.

340.5.3 CONTRACTION JOINTS

340.5.3.1 Contraction joints shall be constructed in slip formed curbs, curb and gutter, walks, and gutters as hereinafter specified. The joint shall be either cut or tooled to a minimum depth of 1 inch at curb, curb and gutter, and gutter, and the greater of either 1 inch or 1/4 the actual depth of the concrete at sidewalks and slabs on grade. The contraction joint shall be tooled at all exposed faces of the fresh placed concrete.

340.5.3.2 Spacing: Unless otherwise shown on the plans or authorized by the ENGINEER, the location and spacing of contraction joints shall be as specified in the Standard Detail Drawings and herein.

340.5.3.3 Contraction joints in extruded curb, curb and gutter, and gutters shall be placed at regular intervals not to exceed 12 feet.

340.5.3.4 Contraction joints shall be placed in all types of sidewalk at regular intervals not less than the width of the sidewalk nor greater than 6 feet.

340.6 FINISHING: Surfaces of the various items of work shall be finished as specified herein. Edges of concrete at expansion joints shall be rounded to 1/4 inch radius. Upon completion, the finished surface shall be true to line and grade and free from irregularities.

340.6.1 CURB:

340.6.1.1 The front forms may be stripped as soon as the concrete has set sufficiently but must be removed before the expiration of 6 hours after pouring. Immediately following the stripping of these forms, Class A mortar, as prescribed therefor in Section 106 thinned to the consistency of grout, shall be applied to the curb face. If monolithic curb and gutter is being constructed, this mortar shall be applied to the full exposed face; otherwise, it shall extend for an additional 2 inches below the gutter.

340.6.1.2 The face and top of the curb shall then be carefully troweled with a "steel mule" shaped to match the profile of the curb, curb and gutter, to a smooth and even finish, the top being finished to a transverse slope of 1/4 of an inch toward the front, with both edges rounded to a radius of 3/4 of an inch. Contraction joints, perpendicular to the flow line and in returns radial to the curve, shall be placed in the curb top and face and in the gutter. The surface shall be finished with a fine hair broom parallel with the line of the flow line.

340.6.2 SIDEWALK:

340.6.2.1 Following the placing of concrete, the surface shall be struck and floated to a true and even grade, free from waves and irregularities. After the floating contraction joints shall be made to a depth of 1 inch. The work shall then be carefully floated to a smooth and even finish, with the contraction joint and expansion joint edges rounded to a radius of 1/8 of an inch. The finished surface shall be given a fine hair broom finish, applied transverse the direction of travel of the sidewalk.

340.6.2.2 Contraction joints or block joints shall not exceed intervals of 6 feet. On straight work, the joints shall be parallel with and at right angles to the line of the work; at curves the joints shall, in general, be along lines concentric with the curve radius. The contraction joint shall be made with jointer tools that will round the edges to a radius of 1/8 of an inch, with a depth of not less than 1 inch. The finished joint opening, exclusive of radii, shall not be not less than 1/8 inch nor greater than 3/16 inch. The CONTRACTOR will be required to have a sufficient number of jointer tools on the job to accomplish the above specified requirements.

340.6.2.3 The concrete shall be cured in accordance with the requirements of SECTION 349.

340.6.3 GUTTER:

340.6.3.1 After the concrete has been thoroughly consolidated the surface shall be worked to a true and even grade by means of a float. Contraction joints shall be sawed or tooled at intervals not to exceed 6 feet, perpendicular to the flow line. The finished surface shall be textured longitudinally with a fine hair broom finish.

340.6.3.2 Side forms shall remain in place until the

concrete is sufficiently set, after completion of the gutter, but must be removed before the work will be accepted. The concrete shall be cured in accordance with the requirements of SECTION 349.

340.6.3.3 Valley gutter or cross gutter sections reinforcement steel and steel placement shall be constructed accordance with the plans and detail drawings. The reinforcement steel shall be in accordance with Section 102. The finished surface shall conform to the required roadway section as to both line and grade. The gutter sections will not be opened to traffic until specimen cylinders have attained a compressive strength of not less than 85% of its design strength or after 14 days or as authorized by the ENGINEER.

340.6.4 CONCRETE SLOPE PAVEMENT:

340.6.4.1 All subgrade preparation required for this item shall be done in accordance with applicable provisions of Section 301 with the exception that minimum density requirements will be 90% of maximum density as determined by ASTM D1557 or ASTM D698.

340.6.4.2 Reinforcement shall be included where shown on the plans or as specified.

340.6.4.3 Thickness of concrete shall be as specified or as shown on the plans. Concrete shall be screeded and finished with ten foot straight edge, lapped at ½ its length or equivalent, to a plane surface having no variation when measured with a 10 foot straight edge in excess of 1/4 inch, unless a curvilinear surface is designated for a particular job. All concrete work shall be in accordance with Sections 101 and 349.

340.7 CURING:

340.7.1 GENERAL: Immediately after the operations have been completed on all concrete, the CONTRACTOR shall initiate the curing of the concrete as specified in Section 349 and/or as approved by the ENGINEER.

340.8 DRIVEWAY ENTRANCES:

340.8.1 Driveway entrances shall be provided in new curbs at all existing driveways along the line of the work and at locations shown on the plans or as directed by the ENGINEER.

340.8.2 The location and construction details for driveways shall conform to the construction plans or Standard Detail Drawings, or as authorized by the ENGINEER.

340.8.3 Where walks are to be constructed across driveways, the thickness of the walk shall be not less

than 6 inches, unless otherwise specified or shown on the plans.

340.9 DRAINAGE OUTLETS THROUGH CURB: The CONTRACTOR will be required to construct suitable outlets through the new curb for all existing building drains along the line of the work, as per Standard Detail Drawings.

340.10 MISCELLANEOUS TYPES OF CURB, GUTTERS, SIDEWALKS: Extruded type concrete curb and gutter, precast curb and gutter sections, cut stone curbs, brick sidewalks, flagstone " sidewalks, etc., will permitted where approved by the ENGINEER and in accordance with the plans and Supplementary Technical Specifications.

340.11 REPAIRS AND REPLACEMENTS:

340.11.1 New work that is found to be defective or damaged prior to acceptance and/or existing work damaged by the CONTRACTOR's operation shall be repaired or replaced by the CONTRACTOR at no expense to the OWNER. Defective or damaged concrete areas shall be repaired by neatly saw cutting at right angles to the face of curb and removing and replacing the effected area. Removals of defective concrete shall be either the entire area between existing joints or if a minimum of 6 feet can be maintained to an existing joint, an intermediate saw cut may be permitted when approved by the ENGINEER.

340.12 TESTS: Testing procedures shall be as provided for in SECTION 101.

340.13 BACKFILLING AND CLEANUP: Backfilling and compaction to the finished surface of the newly constructed improvement must be completed before acceptance of the work.

340.14 MEASUREMENT AND PAYMENT:

340.14.1 MEASUREMENT:

340.14.1.1 Concrete curbs and gutters shall be measured by the linear foot per each type of curb and gutter.

340.14.1.2 Concrete sidewalks, driveways, valley gutters, gutters alley intersections shall be measured by the square foot per each type of improvement.

340.14.2 PAYMENT:

340.14.2.1 The payment for concrete curb and gutter shall be at the contract unit price and SECTION 101 per linear foot per each type of curb and gutter, complete in place, which shall include all materials, equipment and labor required in the final grading,

subgrade preparation (subgrade compaction), placing, finishing, curing, backfilling and cleanup.

340.14.2.2 The payment for concrete sidewalks, drivepads, valley gutters, gutters and alley intersections shall be at the contract unit price and SECTION 101 per square foot per each type of improvement, complete in place, which shall include all materials, equipment and labor required in the final grading, subgrade preparation (subgrade compaction), steel reinforcement (when and where required), placing, finishing, curing, backfilling and cleanup.

TRAFFIC CONTROL

400.1 GENERAL

This section contains specifications which are relative to the protection of the public with respect to traffic control, such as: concrete wall and metal barrier, barrier posts, fencing, traffic signal equipment, street lighting equipment, signing and markings

400.2 CONTENTS

SECTION No.	Title
401	Concrete Wall and Metal Barriers
410	Fences
420	General Clauses for Traffic Signal and Street Lighting Systems
421	Signal and Lighting Service Systems
422	Signal and Lighting Standards
423	Foundations for Signal and Lighting Installations
424	Electrical Conduit
425	Pull Boxes, Splice Cabinets and Manholes
426	Wiring
427	Signal Assemblies
428	Vehicle, Pedestrian, and Emergency Vehicle Detectors
429	Traffic Signal Controllers
430	Removal of Traffic Signal Pressure Detector
431	Beacons and Special Signal Equipment
432	Luminaries
440	Reflectorized Painted Pavement Markings
441	Retroreflective Preformed Plastic Pavement Markings
443	Pavement Marking Removal
450	Traffic Signs and Sign Structures

DIVISION 33 – UTILITIES

VILLAGE OF TAOS SKI VALLEY – ADMINSTRATION BUILDING

SECTION 33_7173 – ELECTRICAL UTILITY SERVICES

1.0 GENERAL

1.1 SECTION INCLUDES

- A. Arrangement with Utility Company for permanent electric service.
- B. Underground service entrance.
- C. Metering equipment.

1.2 RELATED SECTIONS

- A Excavating.
- B. Backfilling.
- C. Trenching.
- D. Cast-In-Place Concrete: Transformer pads.
- E. Section 26_0533.
- F. Section 26 0526.

1.3 **REFERENCES**

A. ANSI/NFPA 70 - National Electrical Code.

1.4 SYSTEM DESCRIPTION

- A. Utility Company : Kit Carson Electric Cooperative
- B. System Characteristics: 120/208 Volts, three phase, 4 wire and 120/240V, 1PH, 3W

1.5 SUBMITTALS

- A. Submit under provisions of Section 260500.
- B. Submit Utility Company prepared drawings.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with Utility Company written requirements.
- B. Maintain one copy of each document on site.

ELECTRICAL UTILITY SERVICES

VILLAGE OF TAOS SKI VALLEY – ADMINSTRATION BUILDING

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene two weeks prior to commencing work of this Section.

1.9 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Utility Company drawings.

2.0 **PRODUCTS**

2.1 UTILITY METERS

A. Meters will be furnished by Utility Company.

2.2 METERING TRANSFORMER CABINET

A. Conform to utility requirements for instrument metering.

2.3 TRANSFORMER PAD

A. Description: Cast in place concrete transformer pad in accordance with utility requirements.

3.0 EXECUTION

3.1 EXAMINATION

- A. Verify conditions under provisions of Division 1.
- B. Verify that service equipment is ready to be connected and energized.

3.2 **PREPARATION**

- A. Make arrangements with Utility Company to obtain permanent electric service to the Project.
- B. Coordinate location of Utility Company's facilities to ensure proper access is available.

ELECTRICAL UTILITY SERVICES

VILLAGE OF TAOS SKI VALLEY – ADMINSTRATION BUILDING

3.3 INSTALLATION

- A. Install primary power conduits from location shown on the drawn to location of new padmount transformers
- B. Install concrete foundation for utility transformers.
- C. Install service entrance conduits and wire from padmount transformers to service disconnects.

END OF SECTION 33_7173

TRENCHING AND BORING FOR UTILITIES

700.1 GENERAL

This section pertains to the trenching, backfilling and compaction for all utilities. Also included in this section are the requirements for boring, drilling and jacking of casings for utility carrier pipes.

700.2 CONTENTS

Section No. 701 710 Title Trenching, Excavation and Backfill Boring, Drilling and Jacking
TRENCHING, EXCAVATION AND BACKFILL

701.1 GENERAL

Trench excavation and backfill for underground utilities, sanitary sewer, storm sewer, water lines, and appurtenances shall conform to these specifications or as specified in the Supplemental Technical Specifications or as authorized, in writing, by the ENGINEER.

701.2 REFERENCES

701.2.1 ASTM:

701.2.2 This Publication:

Section 207 Section 301 Section 302 Section 336 Section 337 Section 340

701.3 TERMINOLOGY

701.3.1 For the purpose of these specifications in this Section, the descriptive terms "flexible," "plastic" and "non-rigid" are similarly interchangeable as utilized in these specifications and appurtenant reference material.

701.3.2 Rigid pipe: shall be reinforced concrete, concrete cylinder, and vitrified clay pipes.

701.3.3 Flexible pipe shall be polyvinyl chloride, polyethylene, ductile iron, and corrugated metal pipes.

701.3.4 Standard Detail Drawings show the trench cross-sections which identify the meaning and limits of terminology used in these specifications for the terms "foundation, bedding, haunching, initial backfill, final backfill, embedment, pipe zone, cover, springline, and pipe width."

701.3.5 The Unified Soil Classification System in ASTM D2487 Shall be utilized for the purpose of

material classifications. See Table 701.3.A for a listing of referenced soil classes. 701.4 NOTIFICATION OF FORTHCOMING WORK

701.4.1 To assure that the construction work progresses in a timely manner and that good public relations are maintained with the property owners, the following actions are considered essential:

701.4.1.1 Prior to the start of construction the CONTRACTOR shall assist the ENGINEER in notifying the adjacent property owners as to when popper uncertain the estimated completion dates anticipated access blockages.

D-2487	D-2922
D-3017	D-4318

TABLE 701.3.A EMBEDMENT SOILS CLASSIFICATIONS

SOILS CLASS	SOIL TYPE	DESCRIPTION
CLASS I SOILS*		Manufactured angular, granular material, ¼ to 1-1/2 inches (6 to 40 mm) size, including materials having regional significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells, complying to the requirements of Class II soils.
CLASS II SOILS**	GW	Well-graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	SW	Well-graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	SP	Poorly graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS III SOILS***	GM	Silty gravels, gravel-sand-silt mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	GC	Clayey gravels, gravel-sand-clay mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	SM	Silty sands, sand-silt mixtures. More than 50% of coarse fraction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	SC	Clayey sands, sand-clay mixtures. More than 50% of coarse fraction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS IV SOILS	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS IV SOILS	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays, Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS IV SOILS	МН	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS IV SOILS	СН	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS V SOILS	OL	Organic silts and organic silty clays or low plasticity. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS V SOILS	ОН	Organic clays of medium to high plasticity. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS V SOILS	PT	Peat, muck and other highly organic soils.

- * Soils are as defined in ASTM D2487, except for Class I Soil which is defined in ASTM D2321
- ** In accordance with ASTM D2487, less than 5% passes No. 200 sieve.
- *** In accordance with ASTM D2487, soils with 5% to 12% passing No. 200 sieve fall in a borderline classification that is more characteristic of Class II than of Class III.

701.4.1.2 Prior to the start of trenching operations, including pavement cutting and removal, the CONTRACTOR should coordinate with the ENGINEER any problem areas and involving traffic control, access to private properties, stockpiling of excavated materials, and other utility conflicts.

701.4.1.3 The CONTRACTOR shall provide the ENGINEER with the name and telephone number of at least two contact persons during non-working hours.

701.5 TRENCH SAFETY

The CONTRACTOR shall be responsible for maintaining all trenches in a safe condition; thereby protecting the workers and the general public. Trench slopes and other protection shall be in accordance with applicable regulations such as the Department of Labor's Occupational Safety and Health Administration Standards 29CFR Part 1926, subpart P *or* any applicable amendments.

701.6 BRACING EXCAVATIONS

701.6.1 Excavation for pipe shall normally be by open unsupported trenches unless local conditions warrant trench bracing.

701.6.2 Excavations shall be braced and sheeted. to provide complete safety to persons working therein and bracing shall comply with applicable Federal (OSHA), State and local laws and ordinances. Support systems for trenches in excess of 20 feet deep and adjacent to existing improvement or subject to vibrations or ground water shall be in accordance with OSHA regulations. The CONTRACTOR shall be fully responsible for sufficiency and adequacy of bracing excavations with respect to work under construction and adjacent utility lines and private property.

701.6.3 If the soil conditions within the trench area require support, the CONTRACTOR may elect to use tight sheeting, skeleton sheeting, stay bracing, trench jacks, or movable trench shield to support the trench during pipe laying operations, such as: bedding preparation, pipe laying, backfilling of haunches and initial zone.

701.6.4 No sheeting shall be permitted to remain in the trench except when, in the opinion of the ENGINEER, field conditions or type of sheeting or methods of construction used by the CONTRACTOR, warrant the supports must remain. The ENGINEER may opt to have the lower portion (within the pipe zone) of the sheeting to remain. If the CONTRACTOR plans on removing the sheeting, he shall submit method to the ENGINEER for approval to treat the void created by the removal of the sheeting within the pipe zone and below.

701.6.5 When a movable trench shield is used, the trailing half of the shield should be notched to the height of the top of the pipe. This will allow the haunch area of the pipe to be compacted properly to the wall of the trench. If the trench shield is not notched, a subtrench shall be excavated for pipe installation such that the bottom of the trench shield does not enter the pipe zone.

701.7 DEWATERING

701.7.1 Trenching and pipe laying operations may encounter standing water or ground water which would preclude the proper placing of bedding, backfilling, and laying pipe. The water shall be removed by pumps and associated equipment, such as well points, to lower the water level. Dewatering shall continue for a minimum 24 hours after placement of any concrete.

701.7.2 Dewatering operations shall remove the water to achieve a stable foundation for pipe embedment and backfilling. The ENGINEER shall determine if adequate foundation has been attained. The ground water shall be lowered to a minimum depth of 6 inches below pipe grades. Should over excavation be necessary due to unsuitable foundation conditions, the ground water shall be additionally lowered as necessary.

701.7.3 The CONTRACTOR shall submit a plan for approval by the ENGINEER as to how and where the waste water will be disposed. Waste water will not be discharged into traffic and pedestrian lanes or onto private properties.

701.7.4 The CONTRACTOR shall obtain permit from the New Mexico State Engineer prior to commencing dewatering operations.

701.7.5 The CONTRACTOR shall also responsible for any adverse effect his dewatering operation has to private property, including providing temporary water to residences and/or business necessitated by the effect on private wells.

701.7.6 The CONTRACTOR shall arrange dewatering operation in a neat and orderly manner such that access to adjacent, properties is maintained, the discharge system does not leak and that any power generation complies with applicable noise limit regulations .

701.8 REMOVAL OF EXISTING PAVEMENT SIDEWALK, AND DRIVEWAY

701.8.1 Existing concrete pavement, sidewalk, or driveway removed in connection with construction shall be replaced, neatly sawed edges. Cuts shall be neat and to true straight lines with no shatter outside the removal area. If a saw cut would fall within 30 inches of a construction joint, cold joint, expansion joint, or edge, the concrete shall removed and replaced to the joint or edge. Concrete sidewalk and/or driveway may removed so that a minimum of 30-inch square is replaced. If the saw cut would fall within 12 inches of a score mark, the score mark.

701.8.2 Existing bituminous pavement removed in connection with construction shall be cut with a saw, pavement break cutting wheel, or other suitable tool approved by the ENGINEER. Care shall taken to assure that the edge of removed pavement does not vary from a straight line more than 2 inches from r mean.

701.8.3 Saw cutting shall be 1-1/2 inches in depth or 1/4 the thickness of the pavement, sidewalk, or driveway, whichever is greater. All saw cuts or other scoring shall be made perpendicular to the surface of the material to be cut.

701.8.4 Any unnecessarily irregular breakage or cracking caused by the CONTRACTOR shall be removed and replaced by the CONTRACTOR without added expense to the OWNER.

701.8.5 The CONTRACTOR shall be responsible for the disposal of removed materials.

701.8.6 Saw cutting is required on all concrete or asphalt paving on State maintained streets or roads.

701.8.7 Paving cuts for manholes and valve boxes and other utility appurtenances shall be

square and at dimensions specified the Standard Detail Drawings or on the construction plans.

701.9 MAXIMUM LENGTH OF OPEN TRENCH

In developed areas, no more than 300 feet of trench shall be opened in advance of pipe laying operations. This distance may be reduced due to traffic control considerations. Backfilling shall begin as soon as pipe is laid and inspected and shall keep pace with the pipe laying. In advance of trenching operations in undeveloped areas, the CONTRACTOR shall submit in writing or on plans for the ENGINEER'S approval, the maximum length of trench that will be open at anyone time. Except by permission of the ENGINEER, the maximum length of open trench in anyone location where concrete structures are cast in -p1ace will be that which is necessary to permit uninterrupted progress. Construction shall be pursued as follows: excavation, formwork, and setting of reinforcing steel, placing of floor slab, walls, and cover slab or arch shall follow each other without anyone of these operations preceding the next nearest operation by more than 200 feet. Failure by the CONTRACTOR to comply with the limitations specified herein or as may be specifically authorized by the ENGINEER may result in a written order from the ENGINEER to halt progress of the work until such time as compliance with this paragraph has been achieved and the work can be proceeded in an orderly sequence of operations.

701.10 WIDTH OF TRENCHES

Trench widths will vary according to the type of pipe used, size of pipe, depth of trench, and soil conditions, The minimum width requirements, indicated below, are for proper laying, aligning and jointing of pipe as well as trench grading, bedding preparation, and backfilling.

701.10.1 TRENCH WIDTH FOR RIGID PIPE MATERIALS: Trench widths from bottom of pipe to a point 12 inches above the top of the pipe shall be kept to the practical minimum required for properly laying, aligning, grading, jointing, and backfilling of the pipe, but no less width than pipe outside diameter plus 16 inches. For stable soils which will stand a vertical cut, the maximum trench width at a point 12 inches above the top of pipe or at a point 5 feet above the bottom of the trench, whichever is less, shall be as follows:

• The pipe outside diameter plus 2 feet for pipes 27 inches in diameter and smaller.

• 1.6 times the nominal diameter for pipes 30 inches in diameter or larger.

701.10.1.3 When soil will not stand vertical. the trench sides shall be sloped to provide not less than the outside diameter plus 16 inches at the pipe invert.

701.10.2 TRENCH WIDTH FOR NON-RIGID PIPES: The minimum clear width of the trench measured at the springline of the pipe should be 1 foot greater than the outside diameter of the pipe. The maximum clear width of the trench at a point 1 foot above the top of the pipe is equal to the pipe outside diameter plus 2 feet. If the maximum recommended trench width must be exceeded *or* if the pipe is installed in a compacted embankment, then pipe embedment should be compacted to a point of at least 2-1/2 pipe diameters from the side of the pipe or to the trench walls.

701.11 ROCK EXCAVATION

701.11.1 Rock is defined as material which cannot be excavated without drilling and blasting. All stone or boulders less than 8 cubic feet in volume will be classified as earth; all larger boulders shall be classified as rock. If blasting is necessary to excavate such materials as shale, hardpan, soft sandstone, cemented gravel, or loose rock which normally can be classified as earth excavation, then this excavation shall be classified as rock excavation. Whenever a ledge of solid rock encountered with earth below it or where alternate lavers of solid rock and earth occur, the earth shall be included in the allowance for rock when the thickness of the layer of earth is less than 12 inches, thus requiring it to be removed by blasting along with the ledges of rock. Blasting will be considered necessary when the soil and rock cannot be excavated at a rate of 50 cubic vards per hour by a competent operator with a back-hoe that has a minimum bucket curling force of 25,000 pounds (John Deere 690 or equivalent).

701.11.2 Whenever rock is encountered in the trench or elsewhere in any excavation required to be made, it shall be excavated to the line and grade as shown on the plans and within the limits described therein, unless otherwise authorized, in writing, by the ENGINEER.

701.11.3 For trenches, rock shall be excavated to a depth of 6 inches minimum below the outside bottom of the conduit except at points of rock and earth transitions at which points the rock shall be excavated to a minimum of 12 inches below the outside bottom of the conduit as shown on the detail sheets for trench cuts and backfill of rock. Any depression in the bottom of the trench caused by overshoot and/or excavating and being 6 inches or greater in depth from a theoretical bottom of trench grade shall be filled to the theoretical bottom of the trench with select soils. The trench shall be backfilled with select backfill material to a point 1 foot above the top of the conduit. The remainder of the trench shall be backfilled as specified herein. The complete trench backfill from the bottom through to the top of the subgrade shall meet the compaction and/or moisture requirements as specified herein.

701.11.4 BLASTING: Suitable weighted covering or mats shall be provided to confine all materials lifted by the blasting within the limits of the trench and to prevent injury of persons or damage to property. Blasting shall be under the supervision of a person qualified and experienced in the use and handling of explosives. All blasting operations shall be done in accordance with applicable local, state, and federal laws, ordinances, and codes regulating the transportation, storage, and use of explosives. Forty-eight hours prior to blasting operations, the CONTRACTOR shall notify the local law enforcement agency.

701.12 FOUNDATION

701.12.1 All pipe shall be bedded on a stable foundation in a trench which is completely free of water. The ENGINEER shall determine the adequacy of the foundation. Class V soils shall not be used as a foundation. If Class V soils are encountered at the bottom of the trench it shall be removed to the depth authorized by the ENGINEER and replaced with Class I, II or III soils.

701.12.2 Where an unstable foundation condition is encountered, it must be stabilized before laying pipe or alternative foundation methods utilized. The CONTRACTOR will be paid for foundation stabilization when required by the ENGINEER. Failure to notify the ENGINEER of an obvious unstable foundation condition prior to proceeding with placement of the pipe shall result in complete removal of the affected pipe, foundation stabilization, and replacement of the pipe at the CONTRACTOR'S expense.

701.12.3 Should the trench be inadvertently overexcavated below the foundation, the area of overexcavation shall be filled with select material in 6 inch lifts and compacted to a density of not less than 95 percent of maximum density, as determined by ASTM D 1557. 701.12.4 Unless specifically approved in writing by the ENGINEER, the CONTRACTOR shall not proceed with pipe embedment in a trench where water is present or the foundation is saturated. Adequate dewatering, as specified in Section 701.7, shall be utilized.

701.13 PIPE EMBEDMENT

701.13.1 GENERAL:

701.13.1.1 The class of bedding used for each pipe shall be as shown on the plans or as specified in the Supplemental Technical Specifications.

701.13.1.2 The CONTRACTOR may request a change in the class of bedding required on a pipe, if authorized by the ENGINEER, all increase in the cost of labor and materials required to include upgrading of the pipe class will be at the CONTRACTOR'S expense with no additional cost to the OWNER.

701.13.2 RIGID PIPE EMBEDMENT:

701.13.2.1 The trenches shall be excavated in conformance with the trench width requirements in Section 701.10 and 701.5.

701.13.2.2 Embedment material shall be Class I, II, III, or IV soils, or lean fill as specified in Section 207.

701.13.2.3 All soil in the embedment zone shall be placed in lifts not exceeding 8 inches in uncompacted depth, except that material along the side of the pipe shall not be placed above the spring1ine until the haunch area of the pipe is adequately filled and sliced such that no voids remain.

701.13.2.4 All soil shall be compacted to a density not less than 90 percent of maximum density, as determined by ASTM D 1557. The CONTRACTOR shall take care to assure that the pipe is not damaged or misaligned during compaction of the embedment.

701.13.3 FLEXIBLE PIPE EMBEDMENT:

701.13.3.1 Proper placement of soils in the embedment zone is extremely important in achieving a satisfactory installation of flexible pipe. The CONTRACTOR shall be aware that the soil classes have differing requirements relative to embedment. There are also differing requirements for embedment in dry and wet conditions (wet conditions meaning that the embedment zone will be subject to ground water).

701.13.3.2 Embedment material shall be Class I, II, or III soils, or lean fill as specified in Section 207.

701.13.3.3 Embedment soil shall be placed in lifts not exceeding 8 inches loose depth. The haunch shall be properly compacted by hand tampers utilizing due caution such that the pipe is not damaged or misaligned. Mechanical tampers shall not be utilized directly over the pipe in the embedment zone.

701.13.3.4 The CONTRACTOR may utilize acceptable on site soils in the embedment area which are in conformance with these specifications. The CONTRACTOR has the option of importing a different soil, however, additional compensation will only be allowed if the on site soils are Class IV or V.

701.13.3.5 Class I soil shall comply with the requirements of Section 302, AGGREGATE BASE COURSE.

701.13.3.6 Class II and III soils shall be compacted to a density of not less than 95 percent of maximum density in the embedment area, as determined by ASTM D 1557. The moisture content shall not exceed 5 percent above optimum.

701.14 FINAL BACKFILL

701.14.1 Final backfill shall consist of homogeneous soil except that boulders, frozen clumps, rubble, and Class V soils are excluded.

701.14.2 Final backfill shall be compacted to a density of not less than 90 percent of maximum density, as determined by ASTM D 1557 unless otherwise specified in the Contract Documents.

701.14.3 The upper portion of the final backfill may require specific soils and compaction in order to provide a suitable foundation for pavements, curb and gutter, sidewalk, or other type of structure.

701.15 COMPACTION METHODS

701.15.1 The CONTRACTOR shall be responsible for the compaction method utilized during foundation preparation, embedment placement, and final backfill except as otherwise specified herein or in the Supplemental Technical Specifications.

701.15.2 The use of mechanical vibratory compactors directly over the pipe is prohibited in the embedment area. Extreme care shall be taken

when utilizing mechanical compactors in the haunch and initial backfill area in order to avoid damage to or misalignment of the pipe. The ENGINEER shall examine any damaged pipe and has the authority to direct that it be replaced with new pipe at no additional cost to the OWNER.

701.15.3 Flooding or jetting shall be allowed if the subsurface soils are compatible to its usage, as authorized by the ENGINEER. It shall not be used for compaction of flexible pipe, when the soil has a plastic limit of 7 or greater, and in areas of collapsible soils. The CONTRACTOR shall take any necessary precautions to minimize to negligible flotation of the pipe.

701.15.4 The CONTRACTOR shall, at the direction of the ENGINEER, excavate the compacted fill as necessary for the purpose of determining the adequacy of the compaction.

701.16 PAVEMENT

701.16.1 Either new street construction or pavement replacements shall satisfy the following design and construction requirements:

701.16.1.1 Unless permanent pavement is specified to be placed immediately, a temporary dust-free patch shall be placed wherever excavation is made through existing pavements, sidewalks, or driveways. The patch shall be placed, rolled, and maintained by the CONTRACTOR to provide a smooth surface for traffic until a permanent pavement is constructed within the time frame specified by the ENGINEER.

701.16.1.2 The subgrade preparation of the area to be paved shall be in accordance with Section 301 of these specifications. The asphalt pavement placed shall be in accordance with Section 336 and the concrete pavement shall be in accordance with Section 337. The placement of the other roadway items shall be in accordance with Section 340.

701.16.1.3 Material thickness for all pavement replacements within residential or arterial streets shall conform to the plans or the Standard Detail Drawings or match the existing pavement as authorized by the ENGINEER.

701.16.1.4 Pavement cuts of 8 ft. or more in width and 100 ft. or more in length shall be paved with a laydown machine.

701.16.1.5 When authorized by the ENGINEER, asphalt concrete base course may be used to

replace surface course thickness requirements on streets that are scheduled for overlay.

701.16.1.6 The edges of all trenches at the base course level shall be neatly trimmed before beginning any paving replacement. All edges of the existing pavement adjacent to the trench cut shall be inspected. Undermined, broken, cracked, or unevenly cut portions shall be removed and the pavement edges retrimmed prior to pavement replacement. All vertical edges of the existing asphalt pavement adjacent to the trench cut and all surface areas for a width of at least 4 inches and no greater than 8 inches, shall be thoroughly cleaned and a tack coat applied prior to placing any hot mix asphalt. The finished surface of the pavement replacement shall be graded to conform to the existing contour both in cross section and profile.

701.16.1.7 Concrete pavement to replace cuts made in concrete paved streets, arterials, etc., shall conform to the Standard Detail Drawings for concrete pavement or in accordance with New Mexico Department of Transportation requirements where applicable.

701.16.1.8 When more than one-half of the surface area of a manhole, lamphole or valve box is found to extend into the area to receive a permanent asphaltic hot-mix surfacing and/or base pavement replacement, the existing pavement surrounding the manhole, lamphole, or valve box shall be removed to within those limits which will permit a permanent pavement replacement to be made in accordance with the approved plans.

701.16.1.9 Asphaltic hot mix shall not be placed upon the concrete collar, nor shall traffic be permitted upon the collar for at least 24 hours, or longer, if so directed by the ENGINEER. A tack coat of asphaltic emulsion may be applied after the concrete has taken its final set. During this time adequate barricading of the area shall be maintained by the CONTRACTOR.

701.16.1.10 If in the course of a pavement removal, a manhole, lamphole, and/or valve box is encountered and has a concrete collar about it and the collar is performing adequately, no special construction need be made in the permanent pavement replacement.

701.16.1.11 The CONTRACTOR shall make any small grade or alignment adjustment of the manhole, lamphole, and/or valve box encountered that is necessary to provide a smooth riding surface between the existing pavement and the patch and/or within the patch itself.

701.16.1.12 TESTING

701.16.1.12.1 A sample of each type of soil encountered shall be classified in accordance with the requirements of ASTM D2487, and the moisture density relationship determined in accordance either ASTM D698 or D1557, whichever is applicable.

701.16.1.12.2 A compaction test shall be taken for each 2 feet depth per 200 feet trench length or less, as directed by the ENGINEER. Compaction tests shall be taken in accordance with ASTM D2922 and D3017. Areas represented by noncomplying tests shall be reworked and re-tested for compliance.

701.17 MEASUREMENT AND PAYMENT

701.17.1 TRENCHING, BACKFILLING, AND COMPACTION:

701.17.1.1 Trenching, backfilling, and compaction shall be combined into one unit and shall be measured and paid for as follows:

701.17.1.2 Measurement shall be made along the center1ine of the pipe.

701.17.1.3 The unit of measurement shall be by the linear foot *per* pipe diameter per specified increment of depth.

701.17.1.4 The following depth increments will apply:

701.17.1.4.1 For water line installations the costs for trenching, backfilling and compaction shall be included in the unit price per linear foot of pipe per pipe diameter for maximum depth, such as: 4 to 14 inch diameter at 6 feet, 16 to 24 inch diameter pipe at 7 feet and all pipe larger than 24 inch at 8 feet. Separate payment will be specified in the Bid Proposal when required depths exceed the above depths.

701.17.1.4.2 For sewer installations the increments shall be 8 feet or less, 8 feet to 12 feet, 12 feet to 16 feet, 16 feet to 20 feet and thereafter at 4 foot intervals.

701.17.1.4.3 All depths shall be measured to the nearest foot.

701.17.1.5 All depths shall be measured from the invert of the pipe to the top of existing ground elevation. The existing ground elevation shall be the elevation of the surface that exists along the

centerline of the pipe at the time of construction staking for said trenching.

701.17.1.5.1 Whenever a special pipe embedment detail is specified, on the plans, the trench depth shall be measured from the bottom of the embedment to the top of existing ground elevation. However, no additional trench depth shall be measured as a result of inadvertent over-excavation nor to accommodate trench dewatering.

701.17.1.6 Payment will be made at the unit price per linear foot per diameter of pipe per depth increment as specified in the Bid Proposal, and will include trenching, backfilling, and compaction for all trench zones. No additional payment will be made for compacted materials to bring trench backfill up to required depth.

701.17.2 OVER-EXCAVATION: Required overexcavation for foundation stabilization shall be measured by the cubic yard of material removed and replaced with compacted suitable material. Payment will be made at the unit price per cubic yard of compacted replacement material and shall include excavation, backfill material, and compaction.

701.17.3 ROCK EXCAVATION: Rock excavation will be measured by the cubic yard within the specified limits of the trench configuration. Blasting will be included in the rock excavation. Payment will be made at the unit price per cubic yard.

701.17.4 UNSUITABLE MATERIALS: Removal and disposal of unsuitable materials from the construction site shall be measured by the cubic yard of excavated material. Payment will be made at the unit price per cubic yard of excavated material.

701.17.5 PAVEMENT. SIDEWALK, AND DRIVEWAYS: Removal and disposal of existing pavement, sidewalks, and driveways will be measured by the square yard or square foot whichever is apropos. Payment will be made at the unit price per square yard or square foot as specified in the Bid Proposal.

701.17.6 SELECT MATERIALS: Where selected material is required in the backfilling operations, the quantity of material will be measured by the cubic yard of compacted material in place in the trench. Payment will be made at the unit price per cubic yard of select material as indicated above.

701.17.6.1 Whenever a special pipe embedment detail is specified, measurement and payment shall be as identified in the Bid Proposal.

701.17.7 DEWATERING: Dewatering operations for trench work shall be measured by the linear foot along the center-line of that portion of the trench which requires dewatering. Payment will be made at the unit price per linear foot of dewatered trench.

701.17.8 PAVEMENT:

701.17.8.1 Permanent or temporary pavement surfacing shall be measured and paid for in accordance with the paving section elements as defined under Section 300 for the specific item of work.

701.17.8.2 Permanent resurfacing or permanent surface patching will be measured on the basis of the square yard for new surfacing as provided in the applicable section of these specifications. For payment purposes, the normal maximum pavement cut width shall be as defined in the Table No. 701.17.8.2

TABLE No. 701.17.8.2

 Soil Stability	Trench Depth (TD)	Pipe Size	Max. Pavement Cut Width	
Stable. Soil stands in a vert. cut	Less than or equ to 5 feet	al equal to 27"	ND less than or	00 + 2 feet
55	Greater than 5'	ND less than or equal to 54	TD + 2 feet 4"	
 ű	"	ND greater tł 54"	nan TD + 3'	1.6 X ND +
Unstable. Soil does not stand in vert. cut	Any	Any	2 X TD + OD	

NORMAL MAXIMUM PAVEMENT CUT WIOTHS ALLOWED FOR PAYMENT PURPOSES

NOTES: 1. TD is trench depth; ND is nominal pipe diameter; and OD is outside pipe diameter.

2. Individual locations or conditions may warrant greater cut widths than those specified above. The ENGINEER shall authorize in writing the increase in the above pavement cut widths.

INSTALLATION OF WATER SERVICE LINES

802.1 GENERAL: This section pertains to the water service line which extends from the distribution line to the water meter.

- 802.2 REFERENCES
- 802.2.1 American Society for Testing and Materials (Latest Editions) (ASTM)
- A-48 Specification for Gray Iron Castings
- B-62 Specification for Composition Bronze or Ounce Metal Castings
- B-88 Specification for Seamless Copper Water Tube
- D-2000 Classification System for Rubber Products in Automotive Applications
- 802.2.2 American Water Works Association (Latest Editions) (AWWA)
- C-800 Underground Service Line Valves and Fittings
- 802.3 MATERIALS

802.3.1 SERVICE LINE FITTINGS: All service line fittings shall be in full compliance with the latest revision of AWWA Standard C 800, except as modified herein. Service line fittings will be of brass which has a composition of 85 percent copper, 5 percent tin, 5 percent lead, and 5 percent zinc. Fittings will be of the type required for the type of service line being installed. All stops shall be of the round, full opening type with no restriction in the opening less than the nominal size. Fittings incorporating a threaded plastic gripper and "O" ring seal may be utilized in lieu of the flared configuration. All service pipe and fittings shall be designed to sustain and operating pressure of 150 psi.

802.3.2 COPPER SERVICE PIPE: The 3/4" to 2" copper service pipe shall conform to ASTM B 88 and shall be Type K, unless otherwise specified. Copper tubing shall be bent with approved tube benders without any kinks or sharp bends. Cutting of tubing will be performed with cutters designed for that purpose.

802.3.3 TAPPING SADDLES:

802.3.3.1 Service saddle bodies shall be of cast iron, ductile iron or bronze; straps, nuts, bolts, and washers shall be of stainless steel or bronze; gaskets shall be vulcanized elastomeric rubber or synthetic rubber compound.

802.3.3.2 The saddles shall be tapped for the type of thread being used on the corporation stop.

802.3.3.3 Tapping saddles for PVC C900 pipe shall have bronze straps and shall be installed as per the manufacturer's printed recommendations.

802.3.4 METERS: Meters are furnished and installed by OWNER for new service line installations. For replacement and relocation work the meters will be furnished by the OWNER and installed by the CONTRACTOR.

802.3.5 METER

802.3.5.1 METER BOXES FOR 3/4"-1" Meters:

802.3.5.1.1 Meter boxes with two meters shall be centered on adjacent property lines.

802.3.5.1.2 The meter box is to be part of an underground enclosure for water meters and will have a cast iron cover plate or lid.

802.3.5.1.3 Meter box will be cast in one piece to form a hollow rectangle and new material or recycled materials shall be used in its manufacture.

802.3.5.1.4 The box material shall have the following minimum mechanical properties at variable ambient temperatures of -20 F to 120 F: compressive strength = 10,000 psi, tensile strength = 1,500 psi and flexural strength = 7,500 psi.

802.3.5.1.5 During testing of the materials at the above ambient temperatures no visual cracking, crazing, checking, blistering, surface pitting or deformation will be noted.

802.3.5.1.6 The finished meter box shall have the following physical properties:

802.3.5.1.6.1 Maximum wall deflection shall not exceed 1/8" at any one point when subjected to earth pressures or forces created during backfilling.

802.3.5.1.6.2 Material used for making the box shall be non-biodegradable when buried and/or exposed to water. Life expectancy of the box shall be at least 20 years.

802.3.5.1.6.3 Overall weight of the box component shall not exceed 80 pounds.

802.3.5.1.6.4 Inside dimensions of the box shall be: width = 16 $\frac{1}{2}$ inches, length = 22 $\frac{1}{2}$ inches, and depth = 24 inches. See Standard Detail Drawings for further dimensions and configurations. This meter box is for one and two meter installations.

802.3.5.1.6.5 Inside and outside surfaces of walls shall be reasonable smooth and free of burrs.

802.3.5.1.6.6 All materials used for box construction shall be approved for use in domestic water supply system.

802.3.5.2 METER COVER AND LID:

802.3.5.2.1 Lightweight and heavyweight meter box covers and lids shall be of Gray Iron casting materials. The light weight type is for use in sidewalk and unpaved areas not subject to traffic loads. The heavyweight type is for use in driveways and along streets having mountable curbs. The size, dimensions and details of the castings are as shown in the Standard Detail Drawings.

802.3.5.2.2 The casting shall conform to ASTM A 48, Class 30. The castings shall be true to pattern in form and dimensions and be free from pouring faults, sponginess, cracks, blowholes or other defects. Castings shall be filleted boldly at angles and arises shall be sharp and true. Edges shall be rounded or chamfered. The castings shall be thoroughly cleaned and the parting lines, grates, and risers ground flush. The lid shall seat firmly in the cover without rocking. The lid top surface shall be flush with the top surface of the cover. The lid shall be easily removed from the cover.

802.3.5.2.3 The cover and lid shall have, integrated in the casting top, a corrugated design to provide a nonslip surface. The lid shall have, integrated in the top of the casting, the words "WATER METER." The cover and lid shall be asphalt painted with coal tar paint. The paint thickness shall not exceed 30 mils.

802.3.5.3 METER BOX FOR 1 ½" AND 2" METERS:

802.3.5.3.1 The meter box is to be part of an underground enclosure for water meters.

802.3.5.3.2 The material used for manufacturing the box, cover and lid shall be new or recycled materials and shall have the following minimum mechanical properties at ambient temperatures from -20 F to 120 F: compressive strength = 11,000 psi, tensile strength = 1,700 psi and flexural strength = 7,500 psi.

802.3.5.3.3 During testing of the materials at the above ambient temperatures no visual cracking, crazing, checking, blistering, surface pitting or

deformation will be noted.

802.3.5.3.4 The finished meter box shall have the following physical properties:

802.3.5.3.4.1 Box, cover and lid shall be rated for a load capacity of 1,000 lbs over a 4" x 4" area.

802.3.5.3.4.2 The overall weight of the box, cover and lid and extension shall not exceed 80 lbs.

802.3.5.3.4.3 Maximum wall deflection shall not exceed 1/8" at any one point when subjected to earth pressures or forces created during backfilling.

802.3.5.3.4.4 The material used for making the box shall be non-biodegradable when buried underground and exposed to water.

802.3.5.3.4.5 The minimum dimensions of the box, cover and lid shall conform to the Standard Detail Drawings.

802.3.5.3.4.6 The walls inside and outside of the box shall be reasonably smooth and free of burrs.

802.3.5.3.4.7 Cover of the meter box must have a non-skid surface and have "WATER METER" inscribed on the top. The cover shall be secured to the box by bolts.

802.3.5.3.4.8 All materials used for constructing the box, cover and lid shall be approved for use in domestic water supply systems.

802.3.5.4 LOCATIONS OF METER BOXES: Meter Boxes shall be located within the right-of-way as shown on Standard Detail Drawings.

802.3.6 CORPORATION STOP: Corporation stop shall be AWWA thread inlet by compression-type outlet or Pack Joint to fit 3/4", 1", 1 ½" and 2" copper tubing. The socket-housing or the rotating ball shall be PTFE coated to avoid metal to metal contact, ensure adequate seal and provide smooth turning operation. Outlet shall have a nominal size Standard AWWA C-800 copper service thread to fit existing OWNER drilling and tapping machine equipment. All casting shall be ASTM B-62 and outlet seals shall be Buna-N

802.3.7 TAILPIECE: The service will be placed in the meter box with a copper tubing tailpiece for 3/4" to 2", protruding from the standard concrete pad into the owner's property with a Pack Joint capped fitting to which the plumber can connect.

802.3.8 COPPERSETTERS: Coppersetters shall have pipe connections for Type K Copper Tubing. The coppersetter shall be an assembly of brass and

copper tubing with a bottom bar, shall have a bronze ball valve on the inlet side of the meter, and shall be furnished with coupling gaskets. Coppersetters shall have temporary threaded plugs in the meter connections and shall be furnished free of excess grease. A stabilizer bar of 12 inches by ½ inch galvanized pipe shall be inserted in the yoke assembly as shown on the Standard Detail Drawings. A coppersetter with dual check valve shall be installed as per the Cross Connection Control section.

802.3.9 CROSS CONNECTION CONTROL: Approved dual check valves shall be installed on all services as indicated on the plans. For water customers having private wells located that connect to the municipal water system shall: agree to completely sever the private well from the premises existing plumbing system and install an approved dual check valve at the water meter. The owner of the premises shall also sign a covenant that runs with the land that the private well shall not be reconnected to the premises previous plumbing.

802.4 SERVICE LINE INSTALLATIONS

802.4.1 NEW 3/4" TO 2" SERVICE LINES:

802.4.1.1 New Service lines are complete new services in accordance with Standard detail Drawings and shall include the following:

802.4.1.1.1 Furnish and install tapping saddle, corporation stop, tubing, coppersetter, meter box, cover and lid and tailpiece, complete in place, including excavation and backfill and flushing.

802.4.1.2 Meters will not be installed as part of this work. However, construction of the meter box and placement of the yoke shall be such that at a later date the meter may be installed properly and easily.

802.4.1.3 The CONTRACTOR shall be responsible for proper vertical and horizontal location of the box over the meter yoke.

802.4.2 REPLACEMENT 3/4"-2" SERVICE LINES:

802.4.2.1 Replacement service lines are essentially new services installed in conjunction with the replacement of the water main. Unless otherwise specified in the Contract Documents, all existing services shall be replaced with new material between the water main and the meter yoke.

802.4.2.2 Replacement service line work does not include any relocation or rehabilitation of the meter. The work shall consist of the following:

802.4.2.2.1 Furnish and install tapping saddle, corporation stop, coppersetter and tubing, complete in place, including flushing. 802.4.2.2.2 Re-connection to the meter.

SUZ.4.Z.Z.Z Re-connection to the meter.

802.4.2.2.3 All necessary excavation and backfill and concrete removal and replacement.

802.4.3 3/4" thru 2" METER RELOCATION:

802.4.3.1 A meter relocation is the relocation of an existing meter to a position closer to or further away from the centerline of the street. The meter relocation item is to be used when the service line is not replaced.

802.4.3.2 A new meter box and cover shall be furnished and installed.

802.4.3.3 A coppersetter shall be used in the reinstallation of the meter, for services sized 3/4" thru 2", and shall be of a height to properly position the meter, vertically, within the box, as shown in the Standard Detail Drawings.

802.4.3.4 When moving the meter toward the property line, new tubing shall be installed, from the inlet connection point of the meter to be relocated, to the coppersetter, and a tailpiece shall be installed on the outlet side of the coppersetter to the property line. When the existing meter is moved toward the street, the gap in the service line shall be filled with new tubing, including connectors.

802.4.3.5 When determined by the OWNER, the existing meter shall be replaced by the CONTRACTOR with a meter furnished by the OWNER. 1" meters will be substituted for 1-1/4" meters.

802.4.3.6 The work and materials shall include the coppersetter, connector pieces, excavation, tubing, backfill, removal of old meter and meter box, installation of new meter, meter box, and concrete pad, necessary disconnections, and connections of the house and meter box service lines, complete restoration of the affected site (including landscaping) and adjustment of the meter to the level shown in the Standard Detail Drawings.

802.6 3/4" thru 2" METER REHABILITATION AND REPLACEMENT

802.6.1 3/4" THRU 2" METER REHABILITATION:

802.6.1.1 Meter rehabilitation is applicable where the meter box deficiency exists. Deficiencies include obsolete, broken above or below grade, improperly sized, or existing location does not allow access to the meter, curb stop or connector pieces (does not meet new installation standards). When any of these conditions exists, the meter box and meter installation shall be rehabilitated, as authorized by the ENGINEER.

802.6.1.2 The work and materials shall include:

802.6.1.2.1 Furnish and install a new coppersetter, meter box, cover and lid and concrete pad.

802.6.1.2.2 Furnish and install any reconnection pieces necessary for a complete service restoration.

802.6.1.2.3 Flushing out of the service line.

802.6.1.2.4 Site restoration (including any necessary landscaping) and cleanup.

802.6.2 3/4" thru 2" METER REPLACEMENT: Meters to be replaced under "Service Line Replacement" and "Meter Relocation" work shall be performed in accordance with the following procedure:

802.6.2.1 All existing meters involved with "Service Line Replacement" and "Meter Relocation" work shall be replaced by the CONTRACTOR with a meter provided by the OWNER as determined by the OWNER.

802.6.2.2 The replacement meter shall be requested, in writing by the CONTRACTOR from the OWNER with documentation of address and size meter for each meter to be replaced, project name and number, and CONTRACTOR's name.

802.6.2.3 The request shall be received at least seven days prior to issuance of meters.

802.6.2.4 The CONTRACTOR will be issued a directive with each meter issued. The CONTRACTOR shall return the directive along with the replaced meter, within five days of replacement of the meter to the OWNER.

802.6.2.5 The work order must be turned in with the specific meter for which the meter replacement was issued. The replaced meter shall have a tag affixed to the meter, by the CONTRACTOR, showing the CONTRACTOR's name, and project name and address from which the meter was removed.

802.6.2.6 The CONTRACTOR shall handle all meters so as not to damage them and shall be responsible for the meters from the time of receipt to turn in. Stolen or lost meters shall be replaced at the CONTRACTOR's expense.

802.7 METER PIT FOR SERVICES 3" AND LARGER: Meter pit construction details and the

installation of the pipe, valves and meter details will be shown on the construction plans. 802.8 MEASUREMENT AND PAYMENT

802.8.1 METERED SERVICE LINE INSTALLATIONS: For 3/4 inch thru 2 inches, new service lines, service line replacements and transfers, meter relocations, and meter replacements, and meter rehabilitation shall be measured and paid for as a completed unit of installation in accordance with the applicable items contained in the Bid Proposal, which payment shall include all materials, labor and equipment required to install, flush and place into service the applicable item.

802.8.2 SERVICE LINE TUBING: Unless otherwise authorized in the Contract Documents or by the ENGINEER, service line tubing shall be considered incidental to the applicable pay item established in the Bid Proposal.

802.8.3 PAVEMENT REMOVAL AND REPLACEMENT: Unless otherwise authorized in the Contract Documents or by the ENGINEER, pavement removal and replacement shall be considered incidental to the applicable pay item established in the Bid Proposal.

SANITARY AND STORM SEWER FACILITIES

900.1 GENERAL

This section pertains to the collection and conveyance facilities for sewage and storm runoff in underground piping systems

900.2 CONTENTS

Section No.	Title
901	Sanitary Sewer Collector and Intercepter Facilities
905	Sanitary Service Lines
910	Storm Sewer Pipe Installations
915	Storm Sewer Drainage Appurtenances
920	Sanitary and Storm Sewer Manholes
925	Vacuum Sewer Collector, Interceptor and Force Main Facilities

SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

901.1 GENERAL

The construction items, specified in this section, are common to sanitary sewer collector and interceptor facilities.

901.2 REFERENCES

901.2.1 ASTM

C 43	D 2321
C 425	D 3034
C 443	F 679
C 478	F 794

901.2.2 AWWA

C 603

901.2.3	This publication per S	SECTIONS:
	101	123
	102	124
	105	125
	106	129
	108	701
	121	

901.3 MATERIALS

901.3.1 PIPE: Sewer line pipe and fittings shall be as specified in other sections, as follows:

Plastic Pipe	Section 121
Reinforced Concrete Pipe	Section 123
Reinforced Concrete Pressure	
Pipe	Section 124
Vitrified Clay Pipe	Section 125
Ductile Iron Pipe	Section 129

901.4 CERTIFICATION

The OWNER/ENGINEER will be supplied with a certification on each item or type of material required in the sewer line, as to that item meeting the specifications and/or the reference specifications before that item is installed.

901.5 INSTALLATION

901.5.1 GENERAL:

901.5.1.1 Pipe and appurtenances shall be new and unused. The type of pipe to be installed shall be as approved by these specifications or unless otherwise shown on the drawings. Pipe and appurtenances

shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken to prevent damage to any pipe coating.

901.5.1.2 The interior of the pipe shall be thoroughly cleaned of foreign material before being lowered into the trench and shall be kept clean during construction operations. When work is not in progress, the open ends of pipe shall be securely closed so that no foreign materials will enter the pipe. Any section of pipe found to be defective before or after laying shall be replaced with sound pipe, or repaired in a manner satisfactory to the ENGINEER, without additional expense to the OWNER.

901.5.1.3 The CONTRACTOR shall install a plug in the new sewer at any point of connection to an existing system. The plug shall remain in place until the ENGINEER authorizes its removal in writing. The CONTRACTOR shall not flush or otherwise discharge any flow into an existing system unless approved in writing by the ENGINEER.

901.5.1.4 Pipe shall be laid to line and grade as shown on the plans and as staked in the field. The bedding of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel. Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustment to the line and grade shall be made by scraping away or filling in with pipe zone material under the body of the pipe, and not by wedging or blocking. When connections are to be made to any existing manhole, pipe, or other improvement, the actual elevation or position of which cannot be determined without excavation, the CONTRACTOR shall excavate for and expose the existing improvement before laying the connecting pipe or conduit. When existing underground improvements may reasonably be expected to conflict with the line or grade established for the new sewer line, the ENGINEER shall request the CONTRACTOR to excavate as necessary to expose and locate such potentially conflicting underground improvements prior to laying the new pipe. Any adjustment in line or grade which may be necessary to accomplish the intent of the plans will be made, and the CONTRACTOR will be paid for any additional work resulting from such change in line or grade in the manner provided for in the General Conditions.

901.5.1.5 Connections to existing manholes shall be made by core drilling through the manhole wall. The CONTRACTOR shall take care to avoid unnecessary damage to the existing manhole.

901.5.1.6 Pipe shall be laid upgrade in a continuous operation from structure to structure, with the socket or collar ends of the pipe upgrade unless otherwise permitted by the ENGINEER.

901.5.1.7 Sanitary sewer mains shall not be constructed under walkways, sidewalks, curbs and gutters, drivepads, or similar concrete structures by tunneling underneath them. The CONTRACTOR will cut these concrete structures by using a concrete saw or, at his option, he may remove the section of the concrete structure to the nearest full expansion joint or edge.

901.5.2 PLASTIC PIPE INSTALLATION:

901.5.2.1 Plastic sewer pipe shall be connected and placed in the trench in accordance with the manufacturer's recommendations. Where a conflict arises with this Specification, this Specification shall control. Trenching, embedment, and backfill shall be as specified in Section 701.

901.5.2.2 The reference mark (a distinct circumferential line) is placed on the pipes spigot end by the manufacturer to indicate the correct depth of spigot penetration into the pipe gasket joint. If the pipe is seated too deep or too shallow the pipe may buckle or separate due to thermal expansion/contraction. Spigot penetration shall be within 1/4" of the manufacturer's recommended mark.

901.5.2.3 For plastic pipe connection to manholes the CONTRACTOR shall install an appropriately sized press seal gasket, such as PS-10 by Press Seal Gasket Corporation, Large Diameter Waterstops for Concrete Manhole Adapters by Fernco, or approved equal. The gasket shall be installed per manufacturer's directions. No direct payment shall be made for this item; this cost shall be included in the pipe bid item price.

901.5.2.4 Not less than thirty (30) days after the installation and backfilling of plastic sewer pipe, including any service connections, the CONTRACTOR shall, in the presence of the ENGINEER, test deflection with a mandrel (GO - NO GO device). The mandrel shall be hand pulled. All pipe with deflections in excess of five percent of the base internal diameter, as determined by ASTM D 3034, ASTM F 679, or ASTM F 794, shall be excavated, pipe removed, new pipe installed,

backfilled, compacted and retested after an additional period of at least thirty days. Mandrels shall have 9 ribs and be only hand pulled through the test section. The CONTRACTOR shall furnish the mandrels. The length of the minimum radius portion of the mandrel shall not be less than the one-third of the nominal diameter of the pipe tested. The pipe shall be flushed and cleaned by the CONTRACTOR prior to testing. No flow will be permitted in the pipe while testing for deflections.

901.5.2.5 All expenses for trenching, removal of pipe, furnishing new pipe, installation of new pipe, compacted backfill, paving, and other related work that is required because of failure to meet deflection test requirements shall be borne by the CONTRACTOR.

901.5.2.6 Acceptance of plastic pipe sewers will be made only after these deflection test requirements have been met.

901.5.2.7 Minimum Diameters of Mandrels

901.5.2.7.1

Nominal <u>Pipe Size</u>	Min. Mandrell Diam.
8 in.	7.28 in.
10 in.	9.08 in.
12 in.	10.80 in.
15 in.	13.20 in.
18 in.	16.13 in.
21 in.	19.00 in.
24 in.	21.36 in.
27 in.	24.07 in.

901.6 JOINTS FOR PIPE

901.6.1 JOINTS FOR CLAY PIPE (FACTORY FABRICATED AND INSTALLED COMPRESSION-TYPE JOINTS FOR VITRIFIED CLAY PIPE):

901.6.1.1 Joint material shall be any one of the types specified in ASTM C 425 and shall meet all requirements of that specification and Section 125.

901.6.1.2 The CONTRACTOR shall furnish the ENGINEER complete information concerning the type and make of all joint material which he intends to use under the contract including certification that the joint material meets the requirements of these specifications.

901.6.1.3 In addition to all other tests required, the ENGINEER may select at random and perform the test on 2 joints for each 250 feet of pipe or fraction of each size of any lot of pipe to be tested.

901.6.1.4 The pipe joints shall not leak when subjected to the shear loading and hydrostatic tests as per ASTM C 425.

901.6.2 JOINT FOR CONCRETE PIPE:

901.6.2.1 The type of joint to be used shall be as shown on the drawings or as specified in the Supplementary Specifications.

901.6.2.2 Gasketed type of joints for circular reinforced concrete pipe shall be used (See Section 123).

901.6.2.3 Rubber gaskets for making compression type joints for circular concrete pipe shall be factory fabricated in accordance with ASTM C 443 and C 361; for circular pipes 12 inches in diameter and larger shall be rubber gasket and shall be handled, primed, installed, etc. in strict accordance with the manufacturer's recommendations.

901.6.2.4 The CONTRACTOR's attention is particularly called to ASTM C 443, regarding storage of gaskets.

901.6.2.5 The sealing of the plastic liner at the pipe joints shall be in strict accordance with Section 122.

901.6.2.6 The ends of the pipe shall be so formed that when the pipes are laid together and joined, they shall make a continuous and uniform line of pipe with a smooth and regular surface.

901.6.2.7 For elliptical or arch reinforced concrete pipe, the joints shall be tongue and grove. Mastic material, such as: RAMNEK, KENT SEAL, or approved equal, will be used to seal joints.

901.6.2.8 The CONTRACTOR shall furnish the ENGINEER complete information concerning the type and make of all joint material which he intends to use under the contract, including certification that the joint material meets the requirements of these specifications.

901.6.3 JOINT FOR PLASTIC SEWER PIPE (PVC): 901.6.3.1 Refer to ASTM D 2321 and ASTM F 794 for pipe laying and joining of pipe guidelines.

901.6.3.2 Prior to the laying of pipe, each pipe component shall be inspected for damage and

cleaned. Damaged components shall be rejected or repaired.

901.6.3.3 All joints will be assembled in accordance with manufacturer's published recommendations. If a lubricant is required to facilitate assembly, it shall have no detrimental effect on the gasket or on the pipe when subjected to prolonged exposure. Proper jointing may be verified by rotation of the spigot by hand or with a strap wrench. If unusual joining resistance is encountered or if the insertion mark does not reach the flush position, disassemble the joint components and repeat the assembly steps. Note that fitting bells may permit less insertion depth than pipe bells. When mechanical equipment is used to assemble joints, care should be taken to prevent over insertion.

901.7 TESTING FOR LEAKAGE

901.7.1 GENERAL:

901.7.1.1 Unless otherwise shown on the drawings or specifically deleted by the ENGINEER, in writing, all sanitary sewers shall be tested for leakage.

901.7.1.2 The CONTRACTOR may, at his option, Air Test the sanitary sewer line before backfilling the trench to aid the CONTRACTOR in checking the installation for any defects. Such testing is at the option of the CONTRACTOR and shall not constitute an acceptance test under these specifications.

901.7.1.3 The test for acceptance and compliance with these specifications shall be performed after the pipe zone backfilling has been completed. In the case of new sanitary sewer lines with house laterals included as an integral part of the project, the test for acceptance and compliance with these specifications shall be performed after the house laterals or stubs have been completed and backfilled. The CONTRACTOR has the option to leave the end of the service line exposed.

901.7.1.4 If the leakage, as shown by the test, is greater than allowed by these specifications, the pipe shall be overhauled by the CONTRACTOR at his expense and, if necessary, relaid until the pipe will satisfactorily pass the test.

901.7.1.5 The CONTRACTOR shall, at his own expense, furnish all water, material, tools and labor for making the test required. All tests shall be made under observation of the ENGINEER.

901.7.2 INFILTRATION TEST:

901.7.2.1 An Infiltration Test shall be used only when excessive ground water prevents satisfactory testing by either the Exfiltration Test or the Air Test. In addition, the Infiltration Test must be performed after backfilling, before any service connections are functioning and at a time when the ground water is over the entire section of pipe and at or near its maximum level.

901.7.2.2 The procedure for conducting an Infiltration Test shall be as follows:

901.7.2.2.1 The pipe section shall be cleaned.

901.7.2.2.2 Determine the groundwater table. The groundwater table shall be determined for each section of sanitary sewer tested.

901.7.2.2.3 Plug the upstream pipe outlet from upstream manhole of the sections being tested with a plug which will assure a tight seal against flow from the upstream portion of the sewer system. Also plug all house laterals and any other connections to the section being tested.

901.7.2.2.4 Install a 90 degree V-notch weir in the downstream manhole of the section being tested. Weir must be installed plumb and sealed to the pipe wall surface.

901.7.2.2.5 A sufficient period of time must be allowed to permit the infiltrated waters to collect and flow over the weir. Water shall flow over the weir for at least thirty minutes prior to taking measurements.

901.7.2.2.6 The head (H) of water flowing over the weir must be measured accurately and the measurement taken at least 18 inches upstream from the crest of the weir.

901.7.2.2.7 Discharge over the 90 degree V-notch weir shall be calculated according to:

Q = 3240 H^{2.5} H = Head in inches Q = Discharge in gallons per day

901.7.2.3 The allowable infiltration shall be 200 gallons per inch of pipe diameter per mile of pipe per day. When there is significantly more than two feet of groundwater above the top of the pipe at the highest point of the section being tested, ten percent additional infiltration above the permitted 200 gal/in.-dia/mi/day limit will be allowed for every 2 foot of additional head.

901.7.3.1 An Exfiltration Test may be conducted wherever the groundwater level is below the crown of the pipe at the highest elevation of the section of sanitary sewer being tested. If the groundwater level is above the crown of the pipe either the Air Test, properly adjusted, or Infiltration Test should be used.

901.7.3.2 The procedure for conducting an Exfiltration Test shall be as follows:

901.7.3.2.1 The pipe section shall be cleaned.

901.7.3.2.2 Plug the downstream pipe outlet to the manhole with a plug which will assure a tight seal against water leakage. Also plug all house laterals and any other connections to the section being tested.

901.7.3.2.3 If the upstream manhole is to be used as a reservoir for maintaining the pressure head on the sewer pipe, the inlet sewer pipe or pipes must be plugged. If a standpipe is to be used as a reservoir for maintaining the pressure head on the sewer pipe, the standpipe must be connected to the sewer pipe in the upstream manhole by a tightly sealed connection.

901.7.3.2.4 The amount of water (volume required to fill the section of sewer under test plus the manhole or standpipe) shall be calculated.

901.7.3.2.5 Water shall then be introduced through the manhole or standpipe. The amount of water introduced shall be metered. The amount of water introduced to fill the sewer should be approximately equal to the calculated amount. If the amount of water required to fill the sewer pipe is significantly greater than the calculated amount, it is an indication of a leak or leaks and consequent saturation of the backfill around the sewer pipe. Saturation of the backfill will invalidate the test.

901.7.3.2.6 The level of water in the manhole or standpipe shall be at least two feet above the crown of the pipe at the highest section of the section of sanitary sewer being tested.

901.7.3.2.7 After filling the pipe at least one hour shall be allowed for water absorption in the pipe. For some materials, up to six hours may be required. After the absorption period, the manhole or standpipe shall be refilled to the established measuring mark and the test begun.

901.7.3.2.8 If the upstream manhole is used as a reservoir for maintaining the pressure head on the sewer pipe, the difference in water surface elevation

901.7.3 EXFILTRATION TEST

from original to final level in a two hour period shall be used to calculate the water lost. The water lost in the two hour period shall be converted into gallons per day. If a standpipe is used as a reservoir for maintaining the pressure head on the sewer pipe, the stand-pipe shall be refilled periodically during the two hour test period to maintain an essentially constant head on the test section of pipe. The amount of water added shall be measured and shall be used to calculate the loss in gallons per day.

901.7.3.2.9 The allowable exfiltration shall be computed based upon the average pressure head above the crown of the pipe for the section tested as follows:

Allowable leakage =
$$\frac{\sqrt{h}}{\sqrt{3}}$$
 1 x 200

Allowable leakage in gallons per inch of pipe diameter per mile of pipe per day.

h = average pressure head above the crown of the pipe, in feet (elevation of water at center of run)

901.7.3.2.10 When the upstream manhole is used as a reservoir for maintaining the pressure head, the allowable leakage from the manhole shall be added to the allowable leakage calculated for the sewer pipe.

901.7.3.2.11 If the sanitary sewer line fails to pass the Exfiltration Test, a re-test shall be permitted only after the groundwater conditions surrounding the pipe return to a condition similar to those existent at the beginning of the test period. The groundwater elevation shall be determined prior to initiation of the second test.

901.7.4 AIR TEST:

901.7.4.1 An Air Test may be conducted under all conditions of groundwater levels surrounding the sanitary sewer pipe. If the groundwater is above the crown of the pipe, the air pressure shall be increased by an increment equal to the pressure exerted by the groundwater over the pipe.

901.7.4.2 The procedure for conducting an Air Test shall be as follows:

901.7.4.2.1 Clean the pipe section (manhole to manhole reach of sewer) being tested by propelling a snug-fitting inflated ball, or other adequate method, through the pipe with water. It is important that the pipe be thoroughly wetted if consistent results are to be expected.

901.7.4.2.2 Plug all pipe outlets with pneumatic plugs. The pneumatic plugs shall be able to resist internal testing pressures without requiring external bracing. Give special attention to house laterals.

901.7.4.2.3 Determine the groundwater level surrounding the section of sewer under test. If the groundwater level is above the crown of the pipe, the test pressures shall be increased by 0.43 psig for each foot of water above the average elevation of the crown of the pipe. Test pressures shall not exceed 10 psig.

901.7.4.2.4 Introduce air slowly to the section of pipe under evaluation until the internal air pressure is raised to 4.0 psig plus any increase required by a high groundwater level.

901.7.4.2.5 Allow the air pressure to stabilize. Air may be added slowly to maintain a pressure in the 3.5 to 4.0 psig (plus groundwater allowance) for two minutes.

901.7.4.2.6 After the stabilization period, when the pressure reaches exactly 3.5 psig (plus groundwater allowance) the stopwatch is started and when the pressure reaches exactly 2.5 psig (plus groundwater allowance) the stopwatch is stopped.

901.7.4.2.7 If the time required for a one pound pressure drop is not less than the allowable time for the pipe section under test to lose air, the section shall pass the leakage test.

901.7.4.2.8 In all cases where an Air Test is conducted, the manholes shall be tested separately as previously specified.

901.7.4.2.9 All persons conducting an Air Test must be made aware of the fact that an Air Test may be dangerous if improperly conducted.

901.7.5 AIR TESTING TABLES: Tables 901.7.5.1 and 901.7.5.2 will be used to determine the required test duration for the section of line being tested.

TABLE 901.7.5.1

SPECIFICATION TIME REQUIRED FOR 1.0 PSIG PRESSURE
DROP FOR SIZE AND LENGTH OF PIPE
INDICATED FOR Q=0.0015

(A) Pipe Diameter (in.)	(B) Minimum Time (min:sec)	(C) Length for Minimum Time (ft)	(D) Time for length (sec)		S	Specificatior	n Time for L	(E) ength (L) Sł	nown (min:se	ec)	
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

Table from: UNI-B-6-79, "Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe"; Uni-Bell Plastic Pipe Assoc.

TABLE 901.7.5.2

		<u>LE1</u>	<u>NGTH OF PI</u>	PE INDIC	CATED FO	<u> OR Q=0.(</u>	<u>)03</u>				
(A) Pipe Diameter (in.)	(B) Minimum Time (min:sec)	(C) Length for Minimum Time (ft)	(D) Time for length (sec)		Speci	fication T	(ime for Le	E) ength (L) \$	Shown (m	iin:sec)	
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:48	11:24	12:49
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	23:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:3	115:23
39	18:25	61	18.054 L	30:57	45:09	60:11	75:14	90:16	105:1	120:2	135:24
42	19:50	57	20.039 L	34:54	52:21	69:48	87:15	104:4	122:0	139:3	157:05
								2	9	6	

SPECIFICATION TIME REQUIRED FOR LOSS OF PRESSURE FROM 3.5 PSIG TO 2.5 FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.003

Table from: WPCF Journal, Vol. 44, No. 4, April 1972; Ramseier, "Testing New Sewer Pipe Installations"; pp. 557-564.

901.7.5.3 EXPLANATION AND USE OF TABLES

Explanation of Tables

Column A	Nominal diameter of pipe (any pipe material).
Column B	Minimum duration of air test regardless of length of line segment being tested. (e.g., 250' of 8" PVC: test duration 3 min. 47 sec.)
Column C	Length of Line associated with minimum duration of air test (Column B).
Column D	L = length of line in feet; product of computation yields duration of air test (e.g., 250' of 12" PVC where ground water is not present ([Table 901.7.5.1]: test duration1.709 (250) = 427.25 sec. = 7 min. 8 sec.)
Column E	Duration of air test for given incremental lengths of line.

<u>Use of Tables</u>

Table 901.7.5.1 is based on an air loss rate of 0.003 cfm/sf of internal surface area. Use for line installations where ground water (and subsequent infiltration) is <u>not</u> present.

Table 901.7.5.2 is based on an air loss rate of 0.0015 cfm/sf of internal surface area. Use for line installations where ground water (and subsequent infiltration) is present

901.8 CLEANING AND INSPECTION

901.8.1 CLEANING: No pipe spalls, rocks, dirt, joint compounds, cement mortar and other trash or obstructions shall be left in a sewer pipe of any size or type. During the flushing operations the manhole outlet shall be bagged or plugged so that this debris will not be carried into or contaminate an existing or active line.

901.8.2 TELEVISION:

901.8.2.1 All completed sewer lines shall be inspected by a television camera before lines become operational or final acceptance of the installation.

901.8.2.2 After the CONTRACTOR has cleaned flushed and retrieved all debris in the line, the CONTRACTOR will notify the project engineer that the line is ready for television inspection. The CONTRACTOR in the presence of the ENGINEER or the engineer's representative shall televise the line with televising equipment specifically designed and constructed for sewerline visual inspection.

The television camera shall be of color and equipped with a rotating lens capable of 360degree rotation with zoom focus and a wideangle optical lens permitting spontaneous focal adjustments, allowing viewing of service lateral connections, joints, pipe walls, etc.

A television report log, completed on the OWNER'S log form, shall be maintained during the television inspection. This log shall be completed to the OWNER'S satisfaction noting the location, project title, name of OWNER, date, type of pipe material, line size, location of services (live or stubouts), manhole or station numbers, and any abnormal or line defects within the line segment. The CONTRACTOR shall be responsible for subsequent televising when line repairs are required or when the previous televising is not satisfactory to the OWNER.

When the televising is complete, the CONTRACTOR shall turn over to the OWNER complete television report logs and the VHS videotape recordings.

901.9 MEASUREMENT ANO PAYMENT

901.9.1 SANITARY SEWER PIPE: Installed pipe shall be measured and paid for as follows:

901.9.1.1 For straight lines the pipe length shall be the intervening distance between the centers of manholes along a line parallel to the pipe invert.

901.9.1.2 For curvilinear lines the pipe length shall be the intervening arc distance between the

centers of manholes along a line parallel to the pipe invert.

901.9.1.3 For lateral lines, such as from main or manhole to a storm inlet, the pipe length shall be the distance between the center of a manhole or centerline of the main to the interior wall face of the storm inlet along a line parallel to the pipe invert.

901.9.1.4 Payment for pipe will be in accordance with the unit price per linear foot per size and material as defined in the Bid Proposal, and shall include: pipe installed in the trench, jointing and coupling materials, and other materials necessary to connect to other sections of pipe, manholes, and other appurtenances.

901.9.2 CONNECTIONS: Connections, tying new sewer lines into existing manholes, shall be measured and paid for on a unit price per each within the size increments as specified in the Bid Proposal. Connections to the shelf section of the floor will not be considered for payment under this bid item.

901.9.3 VERTICAL OROPS: Vertical drops at manholes shall be measured by the linear foot of pipe from the invert of the sewer line to be dropped to the spring line of the receiving main. Payment will be made on the unit price per linear foot per size and type of pipe as specified in the Bid Proposal.

901.9.4 TESTING:

901.9.4.1 Infiltration, ex filtration, and air tests of sewer mains shall include sewer service lines to the property lines or right-of-way lines as installed per the construction plans. No payment will be made for the initial test or subsequent tests.

901.9.4.2 Television inspection is defined in Subsection 801.8.2.

901.9.4.3 There will be no payment for required testing of sanitary sewer manholes.

901.9.4.4 No payment will be made for deflection tests after the required waiting period for PVC sewer pipe installations.

901.9.5 REMOVAL AND DISPOSAL OF SEWER PIPE: Removal and disposal of sanitary or storm sewer lines shall be measured by the linear foot within the specified pipe size increments. Payment will be made on the unit price per linear foot of specified pipe size in the Bid Proposal. No payment will be made until delivery of salvageable materials is verified by Liquid Waste Division. Trenching, backfilling, and pavement removal and replacement will be paid for based on the unit prices for each appropriate bid item in the Bid Proposal. If new pipe is to be installed in the same trench as the removed pipe, only one payment will be made for trenching, backfilling, and pavement removal and replacement.

SANITARY SEWER SERVICE LINES

905.1 GENERAL

905.1.1 The requirements of this section apply only to sanitary sewer service lines installed or reconnected within the public right-of-way or easement. The CONTRACTOR shall be responsible for the integrity of the installation or reconnection of all sanitary sewer service lines during the warranty period.

905.1.2 Sanitary sewer service lines shall be installed at all locations shown on the plans. The CONTRACTOR shall be aware of the importance of accurately recording the horizontal and vertical location of sanitary sewer service lines.

905.2 REFERENCES

905.2.1 ASTM:

D 1557 D 2661 D 2665

905.2.2 This publication: SECTION 701

905.3 MATERIALS

905.3.1 The materials listed herein are considered pre-approved. The CONTRACTOR shall submit to the ENGINEER a certified list of all sanitary sewer service materials which will be utilized on the project. All materials not listed must be submitted to the ENGINEER for approval no less than thirty (30) calendar days prior to the proposed date of use.

905.3.2 The following saddles have been pre-approved for use in the connection of sanitary sewer service lines to collection lines. The CONTRACTOR shall be responsible for assuring that the supplied saddle is compatible with the size and type of both the collection line and service line. Saddles shall be so constructed to have a positive stop to prevent service line from protruding into the main.

905.3.2.1 "Pioneer Sewer Branch Connector" (Hersey) 90 degree (tee) type only, with alignment ring and elastomeric gasket.

905.3.2.2 "Sealtite Sewer Pipe Saddle" (Geneco), Type "S", Type "D" Model "DD", Type "E" Models "EO" and "EBG" and Type "C" Model "CO" (if 4" service is required a 4" x 6" reducer must be used).

905.3.2.3 For all saddles with a 2 1/2" wide strap will be required when saddle is attached to plastic pipe.

905.3.3 The following saddles have been pre-approved for use in the connection of sanitary sewer services to manholes. Manhole connections shall only be allowed if shown on the plans or approved by the ENGINEER.

905.3.3.1 "Fowler Quick-Way Sewer Tap" Models 4-41, 4-42, 6-41, and 6-42.

905.3.4 Service risers, if required, shall be PVC Schedule 40 pipe conforming to ASTM D 2665 cast iron soil pipe (service weight), or ABS Schedule 40 sewer pipe conforming to ASTM D 2661. Only PVC or ABS shall be used when connecting to flexible pipe.

905.3.5 Fittings shall be compatible with the service line material. PVC or ABS fittings shall be schedule 40 injection molded only.

905.3.6 Service line laterals shall be cast iron soil pipe (service weight), PVC Schedule 40, or ABS Schedule 40.

905.4 INSTALLATION (NEW CONSTRUCTION STUB-OUTS)

905.4.1 Service lines shall be installed to the right-of-way line or 5 feet beyond any existing or proposed improvements (i.e., pavement, curb and gutter, sidewalk, etc.).

905.4.2 Saddle connections shall be installed at a 45 degree angle (upward) above the springline of the main sewer and shall be spaced a minimum of 3 feet apart (centerline to centerline).

905.4.3 Service lines shall be installed at a minimum slope of 2 percent with a minimum bury at the terminus of 4 feet, unless otherwise authorized by the ENGINEER. The pipe shall be placed on suitable bedding having a density of not less than 90 percent of maximum density, as determined by ASTM D 1557. The pipe shall be uniformly supported by the bedding. Backfill of the service line shall be carefully placed and compacted per the requirements of Section 701.

905.4.4 The terminus of the service line shall be plugged with an end cap compatible with the pipe size and material. An electronic marker disk shall be placed over the end of the service line and an "S" (3 inches high and 1/4 inch depth) shall be stamped or saw-cut into top of the curb surface directly over the service.

905.5 RISERS

905.5.1 Risers shall be utilized where the sewer main is 15 feet or greater in depth. The riser shall extend to an elevation such that the service line can be installed as specified in Subsection 905.4.3.

905.5.2 The riser shall be installed in accordance with the Standard Detail Drawings. The riser shall be one length of pipe cut to the appropriate length as necessary, unless otherwise approved by the ENGINEER.

905.6 SERVICE RECONNECTIONS

905.6.1 On replacement/rehabilitation type projects, all existing services shall be reconnected to the new sewer main utilizing new saddles and service line pipe. The length of removed existing service line shall be as necessary to accommodate the trench excavation and backfill conditions.

905.6.2 The CONTRACTOR shall visually observe the condition of the existing service line and notify the ENGINEER of any obviously deteriorated or defective conditions. The ENGINEER or CONTRACTOR shall notify the property owner of the situation and the property owner shall be afforded the opportunity to visually observe the service within a reasonable amount of time as dictated by normal construction activity.

905.6.3 The CONTRACTOR shall connect the new service line pipe to the existing pipe at the same slope and alignment as the existing service. Particular care shall be taken to assure a sound connection. The service line shall be uniformly supported on suitable bedding compacted to a density of not less than 90 percent of maximum density, as determined by ASTM D 1557. If service lines are reconnected such that the pipe is not fully supported, hand tampers shall be used to properly compact under the pipe.

905.6.4 The CONTRACTOR shall stamp or saw-cut an "S" (3 inches high and 1/4 inch depth) into top of curb surface directly over the service line. 905.7 RECORD INFORMATION: The CONTRAC-TOR shall provide accurate record information to the ENGINEER regarding both the horizontal and vertical location of the service. The horizontal location shall be by the distance to the nearest foot from both the upstream and downstream manhole lid center. Elevations to the nearest 0.10 foot shall be provided for the saddle, top of riser and invert of the service stub-out, as applicable.

905.8 MEASUREMENT AND PAYMENT

905.8.1 Sanitary sewer service lines installed on new construction shall be measured by the linear foot horizontally from the center of the sewer main, or top of riser, if applicable, to the end of the service line. Payment shall be made at the unit price per linear foot and shall include the saddle connection, pipe, trenching, compaction and backfill, electronic marker disk, testing, and all incidental work necessary to complete the installation.

905.8.2 Sanitary sewer service risers shall be measured by the vertical foot from the top of the sewer main to the top of the riser. Payment shall be made at the unit price per vertical foot, and shall include the pipe and casing (if required).

905.8.3 Sanitary sewer service reconnections shall be measured per each. Payment shall be made at the unit price per each reconnection shall include the saddle connection, new service pipe, connection to the existing service line, and all incidental work necessary for a complete reconnection.

STORM SEWER PIPE INSTALLATIONS

910.1 GENERAL

910.1.1 The construction items, specified in this section, are common to storm sewer pipe installation and pipe type culverts.

910.1.2 Reinforced concrete pipe may be used for storm sewer pipe installations or pipe type culverts. Corrugated metal pipe will only be used for pipe-type culverts.

910.2 REFERENCES

910.2.1 ASTM

C 43	C 478
C 361	D 3034
C 425	F 679
C 443	

910.2.2 AWWA

\sim	602
C	003

910.2.3 This publication per SECTIONS:

101	125
102	129
105	135
106	136
108	137
121	161
123	801
124	

910.3 MATERIALS

910.3.1 PIPE: Sewer line pipe and fittings shall be as specified in other sections, as follows:

Reinforced Concrete Pipe	Section 123
Reinforced Concrete Pressure Pipe	Section 124
Corrugated Metal Pipe and Arches	Section 135
Structural Plate for Pipe, Arches, and Pipe Arches	Section 136
Corrugated Aluminum Pipe and Arches	Section 137

910.4 CERTIFICATION

The OWNER/ENGINEER will be supplied with a certification on each item or type of material required in the sewer line, as to that item meeting the

specifications and/or the reference specifications before that item is installed.

910.5 INSTALLATION

910.5.1 GENERAL:

910.5.1.1 Pipe and appurtenances shall be new and unused. The type of pipe to be installed shall be as approved by these specifications or unless otherwise shown on the drawings. Pipe and appurtenances shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken to prevent damage to any pipe coating.

910.5.1.2 The interior of the pipe shall be thoroughly cleaned of foreign material before being lowered into the trench and shall be kept clean during construction operations. When work is not in progress, the open ends of pipe shall be securely closed so that no foreign materials will enter the pipe. Any section of pipe found to be defective before or after laying shall be replaced with sound pipe, or repaired in a manner satisfactory to the ENGINEER, without additional expense to the OWNER.

910.5.1.3 The CONTRACTOR shall install a plug in the new sewer at any point of connection to an existing system. The plug shall remain in place until the ENGINEER authorizes its removal in writing. The CONTRACTOR shall not flush or otherwise discharge any flow into an existing system unless approved in writing by the ENGINEER.

910.5.1.4 Pipe shall be laid to line and grade as shown on the plans and as staked in the field. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel. Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustment to the line and grade shall be made by scraping away or filling in with pipe zone material under the body of the pipe, and not by wedging or blocking. When connections are to be made to any existing manhole, pipe, or other improvement, the actual elevation or position of which cannot be determined without excavation, the CONTRACTOR shall excavate for and expose the existing improvement before laying the connecting pipe or conduit. When existing underground improvements may reasonably be expected to conflict with the line or grade established for the new sewer line, the ENGINEER shall request and the CONTRACTOR shall excavate as necessary to expose and locate such potentially conflicting underground improvements prior to laying the new pipe. Any adjustment in line or grade which may be necessary to accomplish the intent of the plans will be made, and the CONTRACTOR will be paid for any additional work resulting from such change in line or grade in the manner provided for in the General Conditions.

910.5.1.5 CONTRACTOR shall submit to the ENGINEER the proposed method for making connections to existing manholes. Connection methods will be dependent upon manhole size and pipe sizes. Unnecessary damage to the existing manhole should be avoided.

910.5.1.6 Pipe shall be laid upgrade in a continuous operation from structure to structure, with the socket or collar ends of the pipe upgrade unless otherwise permitted by the ENGINEER. Concrete pipe with elliptical reinforcement shall be laid with the minor axis of the reinforcement cage in a vertical position. Corrugated metal pipe shall be laid with the external laps of the circumferential seams toward the inlet end.

910.6 JOINTS FOR PIPE

910.6.1 JOINT FOR CONCRETE PIPE:

910.6.1.1 The type of joint to be used shall be O-ring rubber gasket joints conforming to ASTM C 361 and C 443.

910.6.1.2 Gasketed Type of Joints for Reinforced Concrete Pipe

910.6.1.2.1 General--The ends of the pipe shall be so formed that when the pipes are laid together and joined, they shall make a continuous and uniform line of pipe with a smooth and regular surface.

910.6.1.2.2 Rubber gaskets for making compression-type joints for concrete pipe shall be factory fabricated in accordance with ASTM C 443; for pipes 12 inches in diameter and larger shall be O-ring and shall be handled, primed, installed, etc. in strict accordance with the manufacturer's recommendations.

910.6.1.2.3 The CONTRACTOR'S attention is particularly called to ASTM C 443, regarding storage of gaskets.

910.6.1.2.4 The CONTRACTOR shall furnish the ENGINEER complete information concerning the type and make of all joint material which he intends to use under the contract, including certification that the joint material meets the requirements of the specifications.

910.6.2 JOINTS FOR CORRUGATED METAL PIPE:

910.6.2.1 The seams of the pipe are to be placed at the sides, not on the bottom. The inside circumferential seams should be placed pointing downstream. Care should be taken to insure that dirt or other particles do not get between the outside of the pipe and the pipe coupling. Paved inverts should be placed and centered on the bottom of the trench. Any damage to the protective lining and coating shall be repaired prior to the backfilling around the pipe.

910.6.2.2 If waterproof joints are called for on the plans or specified in the Supplementary Specifications, the caulking compound or other waterproofing material used shall be subjected to the approval of the ENGINEER.

910.7 TESTING FOR LEAKAGE

Normally storm sewer lines need not be tested, but if in the opinion of the ENGINEER, the workmanship or materials do not appear to be satisfactory, the ENGINEER may require that a section of the storm sewer line be tested in a similar manner as that for a sanitary sewer line, see Section 905.

910.8 CLEANING AND INSPECTION

910.8.1 CLEANING: No pipe spalls, rocks, dirt, joint compounds, cement mortar and other trash or obstructions shall be left in a sewer pipe of any size or type. During flushing operations the manhole outlet shall be bagged or plugged so that the debris will not be carried into an existing active line.

910.8.2 INSPECTION: Before lines become operational or final acceptance of the installation, small size lines shall be inspected by a television camera and larger size lines will be inspected by walking through the line.

910.8.3 TELEVISION: After the CONTRACTOR has cleaned and flushed the line, the CONTRACTOR will notify the ENGINEER that the line is ready for television inspection, if required. Prior to the television inspection (possibly during flushing operation) the CONTRACTOR will insert a 1/4-inch nylon rope in the line for the purpose of towing the television unit through the pipe. The OWNER will perform the first television inspection at no cost to the CONTRACTOR. If during the first inspection debris is found in the line, the television inspection will cease. When further cleanup has been completed, the CONTRACTOR will request the ENGINEER to have a second inspection performed. The cost of the second inspection and any subsequent inspections of that segment of the line will be paid for by the CONTRACTOR at the rate of \$75.00 per hour while the television crew is at the line site.

910.9 MEASUREMENT AND PAYMENT

910.9.1 STORM SEWER PIPE: Installed pipe shall be measured and paid for as follows:

910.9.1.1 For straight lines the pipe length shall be the intervening distance between the centers of manholes along a line parallel to the pipe invert.

910.9.1.2 For curvilinear lines the pipe length shall be the intervening arc distance between the centers of manholes along a line parallel to the pipe invert.

910.9.1.3 For lateral lines, such as from main or manhole to a storm inlet, the pipe length shall be the distance between the center of a manhole or centerline of the main to the interior wall face of the storm inlet along a line parallel to the pipe invert.

910.9.1.4 Payment for pipe will be in accordance with the unit price per linear foot per size and material as defined in the Bid Proposal, and shall include pipe installed in the trench, jointing and coupling materials, and other materials necessary to connect to other sections of pipe, manholes, and other appurtenances.

910.9.2 REMOVAL AND DISPOSAL OF STORM SEWER PIPE: Removal and disposal of storm sewer pipe shall be measured by the linear foot within the specified pipe size increments. Payment will be made on the unit price per linear foot of specified pipe size in the Bid Proposal. Trenching, backfilling, and pavement removal and replacement will be paid for based on the unit prices for each appropriate bid item in the Bid Proposal. If new pipe is to be installed in the same trench as the removed pipe, only one payment will be made for trenching, backfilling, and pavement removal and replacement.

910.9.3 TESTING OF PIPE: No payment will be made for required initial or subsequent tests on sections of the storm sewer line.

STORM SEWER DRAINAGE APPURTENANCES

915.1 GENERAL

The construction items, specified in this section, are related to the storm sewer underground facilities.

915.2 REFERENCES

915.2.1	This publication:	
	SECTION 300	SECTION 701
	SECTION 501	SECTION 910

915.3 MATERIALS

915.3.1 The construction plans will specify the size and material for the pipe between the storm sewer main and the storm water collection structure.

915.3.2 The various types of storm inlets and their relation to curb and gutter, or valley gutter are shown on the Standard Detail Drawings. Construction plans will identify the type to be constructed.

915.3.3 Grating size, material, and configuration shall conform to the Standard Detail Drawings.

915.4 INSTALLATION OF DRAINAGE FACILITIES

915.4.1 Excavation and backfilling for the storm inlet shall be accomplished in accordance with Section 501.

915.4.2 Trenching, backfilling, and compaction for the connecting pipe between the storm sewer main and the storm inlet shall conform to the specifications contained in Section 701. Pipe shall be installed in accordance with Section 910.

915.4.3 All pipe and structures shall be installed per location and elevations, as shown on the construction plans. If during the course of installation, an underground obstruction (i.e., existing utility line) the work shall stop and the ENGINEER shall be immediately notified so that the problem can be resolved.

915.4.4 Direct connection to storm sewer main will be permitted if the main is a minimum of 36 inches in diameter (I.D.) and the connecting line is not greater than 12 inches (I.D.). If storm sewer mains are 48 inches (I.D.) or larger, the connecting line diameter may be increased to 18 inches (I.D.). For connecting line sizes greater than those specified above, the connection to the main will be made into a manhole or by inserting into the main a factory constructed wye. Connection to the main will comply with the Standard Detail Drawings.

915.4.5 Removal of curb and gutter, and sidewalk for installation of a storm inlet shall be made at a scored or full depth joint.

915.4.6 Existing pavement removal and replacement shall conform to Sections 300 and 801 and shall conform to residential or arterial pavement sections of the same material (asphalt or Portland Cement concrete) as the existing pavement.

915.4.7 No width greater than 1/2 inch will be permitted between the inlet grate and the roadside portion of the inlet frame.

915.5 Private drainage facility installations, which are to be constructed under the authorization of "Drainage Facilities Within Public Right-of Way," shall comply with the Standard Detail Drawings and appropriate sections of this publication.

915.6 MEASUREMENT AND PAYMENT

915.6.1 Pavement removal and replacement will be measured by the square yard. Payment will be made at the unit price per square yard per type of replacement paving material, as specified in the Bid Proposal.

915.6.2 Trenching, backfilling, and compaction shall be measured by the linear foot from the main side wall of the inlet to the centerline of the main. Payment will be made at the unit price per linear foot per the average depth increment between connection points, as defined in the Bid Proposal.

915.6.3 Connecting pipe shall be measured by the linear foot along centerline of pipe from the main side wall of the inlet to the centerline of the main. Payment will be made at the unit price per linear foot per type and size of pipe, and shall include pipe in place and all necessary jointing materials.

915.6.4 Storm inlets shall be measured on a unit basis. Payment will be made at the unit price per each type of storm inlet, and shall include structure, grating, excavation, backfilling and compaction, and curb removal and replacement, as defined in Bid Proposal.

915.6.5 Removal and replacement of sidewalk shall be measured by the square foot and payment will be made at the unit price per square foot.

915.6.6 Measurement and payment for manholes will be as indicated in Section 920.

SANITARY AND STORM SEWER MANHOLES

920.1 GENERAL

This section contains items which are relative to the installation of sanitary and storm sewer manholes.

920.2 REFERENCES

920.2.1 ASTM

C 43	C 497
C 139	C 1557
C 478	

920.2.2 This publication

SECTION 101	SECTION 106
SECTION 102	SECTION 161
SECTION 105	

920.3 MANHOLE MATERIALS

Sewer manhole materials shall be as specified in other sections, as follows:

Portland Cement Concrete	Section 101
Steel Reinforcing	Section 102
Concrete Curing Compound	Section 105
Cement Mortar and Grout	Section 106
Gray Iron Castings	Section 161

920.4 MANHOLE CONSTRUCTION

920.4.1 GENERAL:

920.4.1.1 Soil Foundations for manhole base shall be compacted to a density of 95 percent of the maximum density per ASTM D 1557. Compaction limits shall be one foot beyond the perimeter of the concrete base and shall be a minimum of one foot in depth.

920.4.1.2 Manholes shall be constructed in accordance with the Standard Detail Drawings and as shown on the construction plans. Precast reinforced concrete units, concrete blocks or formed inplace, reinforced concrete may be used to construct the manhole.

920.4.1.3 Invert elevation of the pipes entering or exiting the manhole and interior inverts shall not vary more than 0.05 foot from the elevations indicated on the construction plans.

920.4.1.4 All cement used for poured foundations. Mortar, fillets, grout, and concrete shelf construction shall be Type II or approved equal. 920.4.1.5 All concrete for formed in place foundations or bases, concrete shelves. and pipe supports shall be 3000 psi compressive strength concrete.

920.4.1.6 Depending on the size of the pipe, connections to existing and new manholes shall be made by either core drilling through the manhole wall, per-formed for new precast units, or for large-size pipe the manhole wall may be removed by carefully chipping the wall segment which will permit entry of the pipe. In the latter operation, exposed manhole reinforcement should be bent and tied to the reinforcement of the pipe collar. If core drilling is not practical, the CONTRACTOR shall request the ENGINEER to authorize the chipping operation. During either operation the CONTRACTOR shall take care to avoid unnecessary damage to the manhole surfaces or walls.

920.4.2 PRECAST CONCRETE MANHOLES:

920.4.2.1 The vertical sections of the manhole may be of different dimensions in order that manholes of various depths can be readily assembled.

920.4.2.2 Concrete, used for precast bases, vertical sections, and eccentric cones, shall be 4000 psi compressive strength concrete.

920.4.2.3 Vertical sections of the manhole shall conform to the requirements of ASTM C 478.

920.4.2.4 The CONTRACTOR shall submit shop drawings of the precast base and eccentric cone to the ENGINEER for review and approval.

920.4.2.5 Circular precast manhole sections shall be provided with mastic gasket to seal joints between sections, such as RAM-NEK. KENT SEAL. or approved equal.

920.4.2.6 All lifting holes, except Type "C" manhole covers, and gaps at joints shall be filled with a nonshrink grout.

920.4.2.7 Precast concrete manhole bases may be used when approved by the ENGINEER. If approved. it shall be with the understanding that the CONTRACTOR shall be responsible for placing the bases at the specified elevation, location, and alignment. 920.4.3 FORMED INPLACE REINFORCED CONCRETE MANHOLE:

920.4.3.1 The CONTRACTOR shall submit preconstruction drawings of the proposed manholes to the ENGINEER for review and approval.

920.4.3.2 Concrete used for this type of manhole construction shall be 4000 psi compressive strength concrete.

920.4.3.3 If desired, a precast eccentric cone or a flat cover can be used.

920.4.4 CONCRETE BLOCK MANHOLE:

920.4.4.1 The CONTRACTOR shall submit preconstruction drawings of the proposed manhole to the ENGINEER for review and approval.

920.4.4.2 Concrete masonry units for the construction of this type of manhole shall conform to ASTM C 139 and the Standard Detail Drawings. All blocks shall be mortared into place.

920.4.4.3 Eccentric cone or flat-type cover shall be used.

920.4.5 TEE PIPE MANHOLE:

920.4.5.1 Tee pipe manholes will be used for all 4foot-diameter mainline pipes and larger. Horizontal section of the tee pipe shall be the same class of pipe as the adjacent sections. The vertical sections shall comply with the requirements set forth in ASTM C 478.

920.4.5.2 Top of the vertical portion of tee pipe unit will extend a minimum of 18 inches above the outside diameter of the horizontal pipe. The 4-footdiameter vertical section of the tee pipe shall be connected at the longitudinal center point of the horizontal pipe section. The minimum length of horizontal pipe section shall be 8 feet.

920.4.5.3 The CONTRACTOR shall submit to the ENGINEER for review and approval preconstruction shop drawings on the fabrication of the tee pipe section as developed by a precast reinforced concrete pipe manufacturer. Field fabrication of this eccentric pipe unit will not be accepted. Shop drawings for the eccentric cone will also be submitted for review and approval.

920.4.5.4 RAM-NEK, Kent Seal, or OWNER - approved equal sealants shall be used to seal the joints in the vertical portion of this manhole.

920.4.5.5 All lifting holes, except for Type "C" manhole covers, and gaps at joints shall be filled with a nonshrink grout.

920.4.5.6 Standard Detail Drawings show some of the components of the tee-type pipe manhole.

920.4.6 COATING OF MANHOLES:

920.4.6.1 Exterior of Manholes: Exterior coating of manholes shall be required in areas where ground water is present. The coating shall be a water-proofing type of bitumastic or asphaltic material, as approved by the ENGINEER. Application shall be in accordance with the manufacturer's published recommendations.

920.4.6.2 Interior of Manholes: Interior coating of manholes shall be required only when specified on the construction plans. The coating shall be an epoxy resin-type material, be an epoxy resin-type material such as: "Zebron," "Plastite 7122," or approved equal, and shall be capable of protecting the concrete from deterioration due to a gaseous environment. Application shall be in accordance with the manufacturer's published recommendations.

920.4.6.3 Plastering of Manholes: The work shall include the coating of the surface of existing block manholes with plaster as required on the plans.

920.4.7 MANHOLE STEPS:

920.4.7.1 Manhole steps shall be 1/2" diameter, grade 60, reinforcing rod completely encapsulated in copolymer polypropylene or corrosion resistant rubber compound. Steps shall be designed to be cast in place or hammered into holes in manhole walls.

920.4.7.2 Approved manhole steps of only one manufacturer model shall be used on any specific project and shall not be intermixed with other approved steps. Approved steps must bear the manufacturer name and model on the exposed surface of the step and shall be one of the following products or approved equals: M.A. Industries, Inc. -Model PS-2-PFS H. Bowen Co.-Bowco, Model 81213 or 93813 Delta Pipe Products -WEDG-LOK, Model W-II

920.4.7.3 The minimum width of step tread shall be 11 inches. Steps will be spaced uniformly in each manhole. Spacing may be between 12 inches to 16 inches on center. Lower step will be 12 inches above manhole shelf or top of main. The upper step shall be 6 inches below the top portion of the eccentric cone or 6 inches below the bottom of the flat cover. Also the steps shall be aligned vertically with the opening of the cone or cover.

920.4.7.4 Steps shall be embedded in the manhole wall a minimum of 3" inches and protrude from the manhole interior surface a minimum of 4 3/4 inches.

920.4.7.5 Holes for step installation shall be drilled or precast per manufacturer's recommended size. or of sufficient size to allow for step insertion into the wall. Cast-in-plan sockets or tapered holes recommended by the step manufacturer may be used with prior approval of ENGINEER. If the hole has been drilled too large, then the step shall be secured in place by using epoxy grout for the full depth of the drilled hole.

920.4.6 Acceptable manhole step installations must be capable of withstanding a 400 pound. horizontal, pull out load applied in accordance with ASTM C-497.

920.4.8 ADJUSTMENT BRICKS:

920.4.8.1 Manhole adjustment bricks shall conform to the requirements for manhole bricks. per ASTM C 32 for Grade MS.

920.4.8.2 Mortar shall be used to lay the bricks. as well as coating the interior and exterior surfaces of the laid brick. Thickness of the mortar coating shall be 1/2 inch.

920.4. 9 MANHOLE FRAME AND COVER:

The manhole frame and cover for either the sanitary or storm sewer manholes shall conform to the specifications contained in Section 161.

920.5 TESTING OF SEWER MANHOLES:

920.5.1 All sanitary sewer manholes shall be tested for leakage by either a water exfiltration test or a vacuum test. Whichever test is utilized it is recommended that the test be performed prior to backfilling around the manhole and prior to placement of the manhole frame and cover. All inlet and outlet lines shall be properly plugged and the lift holes and barrel joints filled and sealed as specified. The CONTRACTOR shall be responsible for all materials and equipment necessary to perform the test and shall conduct the test in the presence of the ENGINEER or his representative. The CONTRACTOR has the option of performing a manhole test in increments appropriate to the depth of the manhole. 920.5.2 The water exfiltration test shall consist of filling the entire manhole with water to the bottom of the frame elevation. A stabilization period of one hour will be allowed for absorption. After which the manhole shall be refilled as necessary before starting the test. The test period shall be two (2) hours. After which the manhole shall be refilled, measuring the necessary quantity of water. The allowable leakage shall be 0.25 gallons per foot diameter per vertical foot per day, and is represented by the following formula:

V = 0.25 DHT/24

where; V = Allowable loss in gallons

- D = Manhole diameter in feet
- H = Initial depth of water to invert in feet
- T = Duration of test in hours

920.5.3 The vacuum test shall consist of utilizing an inflatable compression band, vacuum pump, gauges and appurtances specifically designed for vacuum testing. Test procedures shall be in accordance with the manufacturer's printed recommendations. The ENGINEER shall be the sole judge as to the adequacy of the equipment.

920.5.3.1 A vacuum of 10" Hg shall be placed in the manhole and the time measured for a drop to 8.5" Hg. The test shall be considered to be successful if the measured time exceeds the test period. Should the test fail, the man- hole shall be repaired as necessary and the test rerun. The test periods are:

920.5.3.2 Sixty (60) seconds for four (4) foot diameter manholes.

920.5.3.3 Seventy-five (75) seconds for five (5) foot diameter manholes.

920.5.3.4 Ninety (90) seconds for six (6) foot diameter manholes.

920.5.3.5 One hundred and Twenty (120) seconds for eight (8) foot diameter manholes.

920.5.4 Normally storm sewer manholes need not be tested unless specifically required by the project plans or supplemental technical specifications. However, if in the opinion of the ENGINEER, the workmanship or materials do not appear to be satisfactory, the ENGINEER may require that any storm sewer manhole be tested in a similar manner as that for a sanitary sewer manhole.

920.6 ABANDONMENT OF MANHOLES

920.6.1 Abandonment of manhole, which is part of a sewer line being abandoned, shall entail the following work and materials:

920.6.2 Manhole will not be removed but will be abandoned in place.

920.6.3 All manhole inlet and outlet lines shall be plugged with a 12-inch- thick concrete or concrete mortar plug.

920.6.4 Salvageable material shall be stockpiled on the job site. The CONTRACTOR shall contact the OWNER to arrange for a representative to inspect the materials for usability. Salvageable materials shall be transported by the CONTRACTOR as directed by the OWNER. CONTRACTOR will receive a receipt for the turned-in materials. Receipts will be submitted to the ENGINEER prior to final acceptance of the Project. Unusable materials will be disposed of by the CONTRACTOR.

920.6.5 Manhole bottom will be pulverized.

920.6.6 The manhole shall be filled with cement treated base (CTB) material to the bottom elevation of the asphalt base course of the pavement or to the ground surface level.

920.6.7 All labor, materials, and equipment necessary to complete this work shall be furnished by the CONTRACTOR.

920.6.8 For historical information the ENGINEER shall have a survey performed which will locate the abandoned manhole, relative to permanent survey markers.

920.7 SEWER MANHOLE REHABILITATION IN REPLACEMENT WORK

920.7.1 The work under this item shall be to replace the existing manhole frame and cover and to place a concrete pad around the existing manhole as required per the construction plans. This work will be done only when an existing manhole is encountered in the normal course of the replacement work that has a light- weight, vented, multi-holed manhole cover.

920.7.2 The work and materials shall include the following:

920.7.2.1 Remove any and all existing brick under frame and replace with new Grade MS brick as necessary to bring new frame and cover up to street grade.

920.7.2.2 Remove and replace existing concrete pad, or construct a new pad.

920.7.2.3 Remove existing steps and replace with new steps or, if steps are nonexistent, install new steps. Steps will be installed as per Subsection 815.4.7.

920.7.2.4 Remove and replace pavement.

920.7.2.5 Excavation and compaction of backfill as necessary.

920.7.2.6 All materials, labor, and equipment necessary to do the work under this item shall be furnished by the CONTRACTOR.

920.7.2.7 The work and materials under this item shall be done according to the manner set forth in the Standard Detail Drawings and other sections of these specifications.

920.7.3 Salvageable material shall be stockpiled on the job site. The CONTRACTOR shall contact the OWNER to arrange for a representative to inspect the materials for usability. Salvageable materials shall be transported bv the CONTRACTOR as directed OWNER. by CONTRACTOR will receive a receipt for the turned-in materials. Receipts will be submitted to the ENGINEER prior to final acceptance of the Project. Unusable materials will be disposed of by the CONTRACTOR.

920.8 MEASUREMENT AND PAYMENT

920.8.1 NEW MANHOLES:

920.8.1.1 Type "C," "E," "F," or "G" manholes of 4foot or 6-foot diameters shall be measured per each within the following increments of depth: 3 to 6 feet, 6 to 10 feet, and 10 to 14 feet. Manholes which are greater in depth than 1 foot shall be measured by the vertical foot. Measurements will be made to the nearest foot and will be from the manhole rim elevation to the manhole invert elevation.

920.8.1.2 Payment for manholes 14 feet deep or less will be made on the unit price per manhole diameter per depth increment as specified in the Bid Proposal. Payment for manhole depths which exceed 14 feet will be made on the unit price per manhole diameter per vertical foot. This payment is in addition to the manhole unit price for the portion above the 14 foot depth.

920.8.1.3 Type "A" or Tee-type manholes shall be measured and paid for by the methods described

in 920.8.1.1 and 920.8.1.2. Measurement will be from the invert of the main line to the manhole rim. Payment under this item will include the normal manhole costs described below, as well as any additional pipe costs for the precast tee and for the concrete cradle under the tee.

920.8.1.4 Payment for any type diameter or depth of manhole will include excavation, compacted backfilling, shelving, cover or cone, leveling bricks, frame and cover, and concrete pad or collar.

920.8.2 ELEVATION ADJUSTMENTS:

920.8.2.1 When a new manhole is installed, no measurement or payment will be made for rim elevation adjustments to conform to street surface grades.

920.8.2.2 The following measurements and payments for rim elevation adjustments on existing manholes will be made for indicated conditions:

920.8.2.2.1 Unit price per inch of adjustment ring for adjustment to manhole frame by the addition of adjustment ring.

920.8.2.2.2 Unit price per inch of leveling brick adjustment.

920.8.2.2.3 Unit price per manhole diameter per vertical foot of adjustment to cone and/or barrel.

920.8.2.3 As required, the following items will be included in the unit price per appropriate adjustment: pavement removal and replacement, excavation, compacted backfilling, concrete collar or pad, leveling bricks, adjusting rings, and/or frame and cover.

920.8.3 COATING OF MANHOLE: Plastering or epoxy coating for manholes shall be measured and paid for on the unit price per square foot of surface area covered.

920.8.4 MANHOLE STEPS: Unless otherwise shown on the Bid Proposal, the cost of manhole steps shall be incidental to the unit prices for construction of manholes of various types and depths.

920.8.5 ABANDONMENT OF MANHOLES: Measurement and payment for abandonment of a manhole shall be the unit price per manhole for defined work in Subsection 920.6.

920.8.6 MANHOLE REHABILITATION IN RE-PLACEMENT WORK: Work under this item shall be measured and paid for by the unit price per manhole for work specified in the Bid Proposal. 920.8.7 TESTING: There will be no payment for required testing of sewer manholes.
SECTION 905

SANITARY SEWER SERVICE LINES

905.1 GENERAL

905.1.1 The requirements of this section apply only to sanitary sewer service lines installed or reconnected within the public right-of-way or easement. The CONTRACTOR shall be responsible for the integrity of the installation or reconnection of all sanitary sewer service lines during the warranty period.

905.1.2 Sanitary sewer service lines shall be installed at all locations shown on the plans. The CONTRACTOR shall be aware of the importance of accurately recording the horizontal and vertical location of sanitary sewer service lines.

905.2 REFERENCES

905.2.1 ASTM:

D 1557 D 2661 D 2665

905.2.2 This publication: SECTION 701

905.3 MATERIALS

905.3.1 The materials listed herein are considered pre-approved. The CONTRACTOR shall submit to the ENGINEER a certified list of all sanitary sewer service materials which will be utilized on the project. All materials not listed must be submitted to the ENGINEER for approval no less than thirty (30) calendar days prior to the proposed date of use.

905.3.2 The following saddles have been pre-approved for use in the connection of sanitary sewer service lines to collection lines. The CONTRACTOR shall be responsible for assuring that the supplied saddle is compatible with the size and type of both the collection line and service line. Saddles shall be so constructed to have a positive stop to prevent service line from protruding into the main.

905.3.2.1 "Pioneer Sewer Branch Connector" (Hersey) 90 degree (tee) type only, with alignment ring and elastomeric gasket.

905.3.2.2 "Sealtite Sewer Pipe Saddle" (Geneco), Type "S", Type "D" Model "DD", Type "E" Models "EO" and "EBG" and Type "C" Model "CO" (if 4" service is required a 4" x 6" reducer must be used).

905.3.2.3 For all saddles with a 2 1/2" wide strap will be required when saddle is attached to plastic pipe.

905.3.3 The following saddles have been pre-approved for use in the connection of sanitary sewer services to manholes. Manhole connections shall only be allowed if shown on the plans or approved by the ENGINEER.

905.3.3.1 "Fowler Quick-Way Sewer Tap" Models 4-41, 4-42, 6-41, and 6-42.

905.3.4 Service risers, if required, shall be PVC Schedule 40 pipe conforming to ASTM D 2665 cast iron soil pipe (service weight), or ABS Schedule 40 sewer pipe conforming to ASTM D 2661. Only PVC or ABS shall be used when connecting to flexible pipe.

905.3.5 Fittings shall be compatible with the service line material. PVC or ABS fittings shall be schedule 40 injection molded only.

905.3.6 Service line laterals shall be cast iron soil pipe (service weight), PVC Schedule 40, or ABS Schedule 40.

905.4 INSTALLATION (NEW CONSTRUCTION STUB-OUTS)

905.4.1 Service lines shall be installed to the right-of-way line or 5 feet beyond any existing or proposed improvements (i.e., pavement, curb and gutter, sidewalk, etc.).

905.4.2 Saddle connections shall be installed at a 45 degree angle (upward) above the springline of the main sewer and shall be spaced a minimum of 3 feet apart (centerline to centerline).

905.4.3 Service lines shall be installed at a minimum slope of 2 percent with a minimum bury at the terminus of 4 feet, unless otherwise authorized by the ENGINEER. The pipe shall be placed on suitable bedding having a density of not less than 90 percent of maximum density, as determined by ASTM D 1557. The pipe shall be uniformly supported by the bedding. Backfill of the service line shall be carefully placed and compacted per the requirements of Section 701.

905.4.4 The terminus of the service line shall be plugged with an end cap compatible with the pipe size and material. An electronic marker disk shall be placed over the end of the service line and an "S" (3 inches high and 1/4 inch depth) shall be stamped or saw-cut into top of the curb surface directly over the service.

905.5 RISERS

905.5.1 Risers shall be utilized where the sewer main is 15 feet or greater in depth. The riser shall extend to an elevation such that the service line can be installed as specified in Subsection 905.4.3.

905.5.2 The riser shall be installed in accordance with the Standard Detail Drawings. The riser shall be one length of pipe cut to the appropriate length as necessary, unless otherwise approved by the ENGINEER.

905.6 SERVICE RECONNECTIONS

905.6.1 On replacement/rehabilitation type projects, all existing services shall be reconnected to the new sewer main utilizing new saddles and service line pipe. The length of removed existing service line shall be as necessary to accommodate the trench excavation and backfill conditions.

905.6.2 The CONTRACTOR shall visually observe the condition of the existing service line and notify the ENGINEER of any obviously deteriorated or defective conditions. The ENGINEER or CONTRACTOR shall notify the property owner of the situation and the property owner shall be afforded the opportunity to visually observe the service within a reasonable amount of time as dictated by normal construction activity.

905.6.3 The CONTRACTOR shall connect the new service line pipe to the existing pipe at the same slope and alignment as the existing service. Particular care shall be taken to assure a sound connection. The service line shall be uniformly supported on suitable bedding compacted to a density of not less than 90 percent of maximum density, as determined by ASTM D 1557. If service lines are reconnected such that the pipe is not fully supported, hand tampers shall be used to properly compact under the pipe.

905.6.4 The CONTRACTOR shall stamp or saw-cut an "S" (3 inches high and 1/4 inch depth) into top of curb surface directly over the service line. 905.7 RECORD INFORMATION: The CONTRAC-TOR shall provide accurate record information to the ENGINEER regarding both the horizontal and vertical location of the service. The horizontal location shall be by the distance to the nearest foot from both the upstream and downstream manhole lid center. Elevations to the nearest 0.10 foot shall be provided for the saddle, top of riser and invert of the service stub-out, as applicable.

905.8 MEASUREMENT AND PAYMENT

905.8.1 Sanitary sewer service lines installed on new construction shall be measured by the linear foot horizontally from the center of the sewer main, or top of riser, if applicable, to the end of the service line. Payment shall be made at the unit price per linear foot and shall include the saddle connection, pipe, trenching, compaction and backfill, electronic marker disk, testing, and all incidental work necessary to complete the installation.

905.8.2 Sanitary sewer service risers shall be measured by the vertical foot from the top of the sewer main to the top of the riser. Payment shall be made at the unit price per vertical foot, and shall include the pipe and casing (if required).

905.8.3 Sanitary sewer service reconnections shall be measured per each. Payment shall be made at the unit price per each reconnection shall include the saddle connection, new service pipe, connection to the existing service line, and all incidental work necessary for a complete reconnection.

SECTION 1200

TEMPORARY TRAFFIC CONTROL

1200.1 GENERAL

This section pertains to barricading and temporary traffic control:

1200.2 CONTENTS

Section No.	Title

1200

Barricading and Temporary Traffic Control

SECTION 1200

BARRICADING AND TEMPORARY TRAFFIC CONTROL

1200.1 GENERAL: The work under this section includes, but is not limited to, traffic control standards needed to ensure safety to motorists, the public, construction workers, and special event participants when City roadways are temporarily disrupted due to construction efforts or special events.

1200.2 REFERENCES

- 1200.2.1 Manual on Uniform Traffic Control Devices, (MUTCD), Part VI, FHWA.
- 1200.2.3 The American Traffic Safety Services Association (ATSSA), Quality Standards for Work Zone Traffic Control Devices.

1200.2.3 This Publication, Latest Edition

SECTION 400 TRAFFIC CONTROL

1200.3 BARRICADING STANDARDS

1200.3.1 Before construction begins all traffic control signs and barricades must be installed in accordance with the approved traffic control plan, construction plans, barricading detour plan or as directed by the OWNER. No construction signing and barricading shall commence until CONTRACTOR is assured that all equipment, manpower, and resources are available to start and complete the work. Where applicable, all signs, barricades, and/or barrels will be moved forward as the construction progresses.

1200.3.2 The name and telephone number of the owner shall be permanently stenciled on all barricades and traffic control equipment. The name and telephone number shall be a non-retroreflective color not over 2 inches in height, and be placed on a non-retroreflective surface of all equipment. Graffiti shall be promptly removed from any all barricades and traffic control equipment. If notified by the OWNER or the ENGINEER, graffiti shall be removed, or the equipment replaced with clean equipment, within four hours or the barricade permit is subject to revocation.

1200.3.3 All advance warning signs approaching a construction zone shall be double indicated (one sign each on left and right sides of approaching traffic) for all multiple-lane roadways with painted or raised medians and where adequate space is available. All double indicated signs shall be the same size. When a sign is placed in a painted median, especially a two-way continuous left-turn lane, a reflectorized barricade must be placed on the back side of the sign to alert motorists approaching from the opposite direction.

1200.3.4 It shall be the responsibility of the CONTRACTOR to remove all construction barricades, signing, and traffic control devices not required at the end of the working day.

1200.3.5 All advance warning signs shall be a minimum of thirty-six inches by thirty-six inches in size with super engineering grade sheeting or better. On high-speed (posted 45mph and above), rural section roadways where adequate pedestrian space is available, forty-eight inch by forty-eight inch signs is preferred. The use of forty-eight inch signs shall be required at locations as published on a list by the ENGINEER. All advance-warning signs not directly applicable shall be removed when not needed, and shall not be left in public right-of-way. All construction signing shall be black on a reflectorized orange field unless otherwise specified.

1200.3.6 Existing posts may be used at some locations, with approval of the ENGINEER. Portable sign supports will be acceptable as an alternate for signs which are to be in place for less than three (3) weeks. The bottom of advance warning signs mounted on barricades or temporary sign supports shall be no less than one foot above the traveled way. All regulatory and advisory signs shall be mounted on sign stands or as otherwise approved by ENGINEER. The placement of portable sign supports shall not block or impede pedestrian access. All signs ground mounted on single or double posts shall have the bottom of the sign seven (7) feet above pavement level.

1200.3.7 Barrels and different types of barricades are generally not intended to be intermixed in the same series of channelization. All barrels may have sand or water ballast limited to one hundred (100) pounds. All barricades shall be placed correctly with diagonal stripes sloping downwards in the direction traffic is to pass. Where barricades extend entirely across a roadway, the stripes must slope downward in the direction toward which traffic must turn. Where both right and left turns are provided, the stripes must slope downward in both directions from the center of the barricade or barricades. Where no turns are intended, the stripes must slope downward toward the center of the barricade or barricades.

1200.3.8 The CONTRACTOR shall inspect and maintain all barricades at least once each day except for barricades on or adjacent to arterial and collector streets which shall be checked twice daily, including inspection during hours of darkness. A log of these inspections showing project, location, date, and time

shall be kept and a copy sent to the Construction Coordination Division upon request. Upon request, the CONTRACTOR shall immediately produce current traffic control logs. Failure to do so may result in suspension of work or revocation of barricade permit.

1200.3.9 All traffic control devices required within traveled lanes after dark are to be equipped with warning lights. Type (A) flashing warning lights shall be used on all devices which are intended to warn motorists or pedestrians of hazards or obstructions in or near the travel path. Type © steady burn lights shall be used on all devices which are intended to define the travel path. All lights shall be operational. Traffic control devices that are damaged, dirty or have substandard reflectorization shall be immediately brought up to standard. Reflectorized sheeted panels shall not be considered as a replacement for a required warning light. Warning lights shall be incidental to payment for traffic control.

1200.3.10 Equipment and materials are not to be stored within fifteen (15) feet of a traveled lane during non-working hours, unless approved by the ENGINEER, which approval cannot be unreasonably withheld.

1200.3.11 CONTRACTOR shall provide and maintain a safe and adequate means of channelizing pedestrian traffic around all work areas throughout the periods of construction. All such channelization shall be arranged to prevent pedestrians from having to enter the roadway in order to pass around the work area. Where required, pedestrian detour signs will be installed by the CONTRACTOR. Where construction impedes or obstructs sidewalk access, CONTRACTOR shall barricade sidewalks and place "Sidewalk Closed" signs accompanied with the appropriate pedestrian detour signing. Pedestrian detour signs shall be incidental to payment for traffic control.

1200.3.12 CONTRACTOR shall provide and maintain a safe and adequate means of channelizing bicycle traffic around all work area throughout the periods of construction when existing bicycle trails, lanes, or routes are designated. Where possible, adequate space for bicyclists must be provided, and bicycle detour signs, including "Share the Road" signs shall be installed. When adequate space is not available to provide for bicycle access, the bicycle facilities shall be adequately detoured around the construction site. The detour route shall minimize out-of-direction travel distance, and shall be adequately signed and directed. Bicycle detour signs shall be incidental to payment for traffic control.

1200.3.13 All barricades, signs, and traffic control equipment shall be properly and adequately ballasted for normal wind loads. For equipment placed for

extended periods (seven days or more), or during the months of February through May, additional ballast shall be required.

1200.3.14 The use of roll-up advance warning signs is allowed, so long as the reflectivity required in the MUTCD is provided. Such signs shall be adequately braced to resist rotation under normal wind loads.

1200.3.15 The use of orange warning flags mounted atop construction warning signs is encouraged and is required in certain instances. Flags mounted atop construction signs is required on all "Reduced Speed Ahead (R2-5a)" signs, "Reduced Speed (R2-5b and R2-1)" signs, all "Double Fine Zone" signs, "Road Closed Ahead (W20-3)" signs, "Detour Ahead (W20-2)" signs, "Flagger Ahead (W20-7)" signs, "Flagger Symbol (W20-7a)" signs, and "Be Prepared to Stop (W20-7b") signs.

1200.3.16 Cones are an acceptable traffic control device under certain situations. Traffic cones are not to be used to separate traffic traveling in different directions. All cones must be a minimum of 28 inches tall. The use of cones as traffic control devices is not allowed during nighttime hours; however if used, all cones used at night must include white, reflectorized bands per MUTCD standards. The use of cones is encouraged for daytime moving closure operations, projects in duration of two hours or less, and special events.

1200.3.17 Type III barricades must be used at all road closures. Multiple type III barricades of the same configuration placed next to each other in the same direction is allowed. A type III barricade or illuminated arrow panel must be used for each lane closure. A minimum of two feet of exposed railing is required on the traveled side (open lanes) of type III barricades. The minimum length of type III barricade for each lane closure is eight (8) feet per lane twelve (12) feet or less in width, and the minimum length of type III barricade required for a sidewalk closure is four (4) feet. The minimum length of type III barricades for a double lane closure is sixteen (16) feet. Additional barricades above the minimum required may be required to fill in gaps for wide lanes, multiple lane closures, or shoulder areas.

1200.3.18 Road closures shall be pre-warned by the use of a "Road Closed to Through Traffic" (R11-4) sign, where appropriate. These signs shall be placed at intersections approaching the road closure with appropriate detour signing. When mounted on a three rail barricade support, the maximum width of sign support shall be six feet. If the detour route is more than one intersection before the road closure, then additional R11-4 signs shall be placed at each intersection between the detour route and the road

closure. "Road Closed to Through Traffic" signs are encouraged to be placed on or near the center of the roadway, but R11-4 signs shall not be placed in an area that block sight distance for motorists and pedestrians. Where sight distance becomes a problem, low-volume intersections may be temporarily converted to a four-way Stop condition, with the approval of the ENGINEER.

1200.3.19 Illuminated arrow panels with a minimum size of 32 square feet may be used in lieu of type III barricades for lane and roadway closures. Arrow panels must be battery or solar powered. The use of diesel, or other noise generating power sources, is not allowed. For roadways with a previously posted speed limit of 35 mph or higher, the use of arrow panels is required for all lane closures. An arrow panel is required for each lane reduction, but is not required for shifting tapers. In residential areas where the arrow panel will be used at night, directional lighting limited to 30 degrees or less must be used to reduce glare into nearby properties. When illuminated arrow panels are used for a lane closure, then the use of vertical panels at the regular MUTCD minimum spacing for the lane reduction taper is allowed.

1200.3.20 For work expected to last one hour or less and for moving closures, reduced barricading may be allowed as approved by the ENGINEER. Reduced barricading on arterial or collector roads shall consist of a minimum of one advance warning sign, a minimum of a three barricade or cone taper, and an illuminated arrow panel.

1200.3.21 For emergency utility work on arterial or collector roadways, the CONTRACTOR must notify the traveling public. If a variable message board is not required by the ENGINEER, a "Utility Emergency Ahead" sign must be installed for each direction of arterial / collector traffic approaching the work site. The "Utility Emergency Ahead" sign must be placed in addition to, and preceding, the three normally required advance warning signs at the same spacing required in the MUTCD for advance warning signs.

1200.3.2 Double fine zones shall be delineated by the

use of "Double Fine Zone" signs as outlined in this section. Double fine zones shall be delineated for construction zones and construction curtilage zones at the request of either the OWNER or ENGINEER. In addition, double fine zones are required on all arterial / collector roadways where there is a: 1.) reduced speed limit; 2.) lane reduction; 3.) reduced design speed; or 4.) traffic hazard. Double fine zones are required for all flagging operations, and work zones with an imminent danger to workers, regardless of the roadway classification. The beginning of the double fine zone shall be clearly marked with a sign stating:

"Construction - Begin Double Fine Zone". The end of the double fine zone shall be clearly marked with a sign stating: "Construction - End Double Fine Zone". If the double fine zone extends beyond one-half mile in length, intermittent signs must be placed no more than one-half mile apart stating: "Construction - Double Fine Zone". Additional intermittent signs are needed following side street entrances. Details for the double fine zone signs are on file with the ENGINEER. Placement of the Begin Double Fine Zone sign shall be immediately following the "Road Work Ahead" sign. Placement of the End Double Fine Zone sign shall be immediately preceding the "End Road Work" sign.

1200.3.23 On arterial or collector roadways with multiple lane closures, the advance warning signs shall indicate the correct number of lanes closed. Arrow panels are required for each lane closure of multiple lane closures on arterial or collector roadways, regardless of the previously posted speed limit.

1200.4 CONFLICTS WITH EXISTING SIGNING, STRIPING, AND SIGNALS

1200.4.1 CONTRACTOR shall not remove, realign, or adjust any official OWNER traffic control device including stop signs, warning signs, or any other traffic or parking control signs, unless approved by the OWNER. CONTRACTOR shall give the OWNER three (3) working day's prior notice of any official OWNER traffic control device that needs to be moved. The OWNER shall take all appropriate actions as soon as practical thereafter. When CONTRACTOR places regulatory signing reducing the posted speed limit as approved by the OWNER, the CONTRACTOR must temporarily cover any and all conflicting speed limit signs. Such covers must be immediately removed once the temporary speed limit reductions are removed.

1200.4.2 The CONTRACTOR is responsible for obliteration of any conflicting striping and responsible for all temporary striping. For temporary situations lasting seven days or less, conflicting pavement markings may be addressed with the proper use of channelization devices and signing, unless otherwise approved or required by the ENGINEER.

1200.4.3 When the construction activity or traffic detouring plans result in less than two signals being visible in any direction at a signalized intersection, additional temporary traffic signals shall be required. A minimum of two signals must be visible within a twenty degree horizontal and vertical cone of vision, as measured from the stop bar for each lane approaching a signalized intersection.

1200.5 STREET AND LANE CLOSURES

1200.5.1 CONTRACTOR shall maintain access to all public and private facilities adjacent to the construction area at all times, including businesses and/or residents. When denying access is unavoidable, CONTRACTOR must coordinate access restriction to times and locations that are reasonably convenient to the property owners and/or residents affected. CONTRACTOR shall construct and maintain access roads, including paved ramps, where deemed necessary by ENGINEER to maintain traffic flow. Business access signs may be required to direct traffic to existing businesses, as directed by ENGINEER or OWNER. No more than three businesses shall be placed on a single sign. In areas of multiple adjacent businesses, only generic "Business Access Only (arrow)" signs are required. For shopping centers with multiple business tenants, the name of the shopping center shall be placed on a sign at each access location. Access signs shall have 5 inch high, white letters with a directional arrow on a reflectorized blue background. Business access shall be rectangular in shape, no taller than wide, and shall be no larger than four feet wide by three feet tall. Business access signs shall not be placed where they block sight distance for either motorists or pedestrians.

1200.5.2 CONTRACTOR shall notify the following services forty-eight (48) hours in advance of any complete street or access closures: Police Department, Fire Department, U.S. Postal Service, Solid Waste Department, Ambulance Services, local schools, and the Transit Department. The CONTRACTOR shall also notify all businesses and residents directly affected by the road closure. For the total closure of arterial or collector roadways, a variable message board must be installed for a minimum of two days prior to the road closure notifying motorists of the dates and times for the closure. A minimum of one variable message board is required for each direction of closure. For the total closure of a local roadway, a sign must be installed for a minimum of two days prior to the road closure notifying motorists and residents of the dates and times of the closure. A minimum of one sign is required for each direction of closure.

1200.5.3 The CONTRACTOR shall be responsible, and shall make appropriate accommodation, for garbage and trash collection, mail delivery, and other essential services needed by residents and businesses affected by CONTRACTOR operations. This effort shall include coordination with U.S. Post Office, Solid Waste Department, and other agencies. Where required, CONTRACTOR shall notify all residents in writing at least two days prior. Such notice shall include at a minimum: dates and times of construction activities and the name and telephone number of the CONTRACTORS contact person. CONTRACTOR shall collect all trash and garbage in the project area and deliver to an accessible location for collection by 7:00 a.m. on the designated trash collection day. Such trash and garbage cannot be deposited onto private property, must not block access, and shall be immediately cleaned up by CONTRACTOR upon pick up by the Solid Waste Department or private trash collection company.

1200.5.4 Total or partial closure of some streets may be restricted to certain hours of the day by the OWNER. Streets having working hour limitations may be noted on the approved construction plans. In cases of emergency work or permit work, streets having working hour limitations will be designated by the ENGINEER. Waivers of the working hour limitations can be obtained from the ENGINEER.

1200.5.5 If construction on streets with working hour limitations is expected to extend past the allowed working hours, plating of the trench and/or temporary asphalt concrete pavement shall be provided so that the roadway is opened to traffic within the allowable work hours. Such excavations must be plated, temporarily patched or resurfaced prior to opening to traffic. A minimum width of 11 feet for each lane of traffic shall be provided, unless otherwise directed by the ENGINEER.

1200.5.6 When detouring low and moderate-volume traffic onto a previously unpaved area, see Table 1200.1 for surfacing requirements.

Table [·]	1200.1
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Time	Shoulder Residential	Shoulder (Other)	Local / Residential	Major Local	Collector	Arterial
Under one day	Compacted Subgrade	Compacted Subgrade	Compacted Subgrade	Compacted Subgrade	Gravel or millings	Gravel or millings
1-3 days	Compacted Subgrade	Gravel or millings	Gravel or millings	Gravel or millings	Treated Millings	2" Asphalt
4-7 days	Gravel or millings	2" Asphalt	Gravel or millings	Treated Millings	2" Asphalt	2" Asphalt
8-30 days	Treated Millings	2" Asphalt	Treated Millings	2" Asphalt	4" Asphalt	4" Asphalt

Table Notes:

The contractor shall be responsible to continually maintain all detours, providing a smooth, drained, and safe roadway surface. All compacted subgrade areas shall be graded regularly to provide a smooth driving surface, and must be treated regularly with water or other approved dust control palliative. During periods of dry and/or windy weather, a water truck must be on-site at all times, and frequent watering may be necessary.

Gravel, millings, or treated millings must be bladed and compacted to provide a stable, smooth driving surface prior to opening to traffic. Such surfacing shall be regularly maintained to provide a smooth and stable driving surface. All temporary asphalt pavement shall be placed upon a compacted subgrade which shall be graded to drain. Treated millings includes millings stabilized with an applied emulsive asphalt.

1200.6 MEASUREMENT AND PAYMENT

1200.6.1 Measurement and payment for barricading and temporary traffic control shall be per lump sum per project except for the items listed below. Payment of additional items will only be made if such traffic control device or services is either approved in the construction plan set or requested by the OWNER in writing. Payment shall include the cost of obtaining all permits and approvals; preparation of traffic control plans; working restricted or extended hours when required; notification to all affected residents, businesses, agencies, or other public contacts; setting and resetting barricades, maintaining barricades, daily removal of barricades when required, flagman operations when required, installation of temporary traffic signals when not required by the OWNER or in the construction plans; coordination with ENGINEER on traffic signal re-timing; hiring of off-duty Police Department Officers; and any and all other costs associated with temporary traffic control except the following:

1200.6.1.1 Measurement and payment of the installation of temporary striping shall be made per lineal foot of striping installed per four inch wide.

1200.6.1.2 Measurement and payment of business access and special signs shall be made on a per square foot basis project duration.

1200.6.1.3 Measurement and payment of Variable Message Boards shall be made per each on a per day (24-hour period) basis.

1200.6.1.4 Measurement and payment of illuminated arrow boards required by the OWNER, or required in the construction plans, shall be made per each on a per day (24-hour) basis.

1200.6.1.5 Measurement and payment of temporary wall barrier shall be made per lineal foot of wall barrier installed and removed at each location per project.

1200.6.1.6 Measurement and payment for temporary traffic signals required by the OWNER, or required in the construction plans, shall be made per each per project duration at each location.