INVITATION TO BID



KENAI PENINSULA BOROUGH PURCHASING AND CONTRACTING DEPARTMENT

ITB20-011 NIKISKI FIRE STATION NO. 3

Release Date:	October 3, 2019
Pre-Bid Conference:	October 10, 2019, 12:30 PM Purchasing and Contracting Department 47140 East Poppy Lane, Soldotna, Alaska 99669
Bid Due Date:	November 6, 2019 no later than 2:00 PM Kenai Peninsula Borough Purchasing and Contracting Office 47140 E Poppy Lane Soldotna, Alaska 99669

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PART I

BIDDING DOCUMENTS



Kenai Peninsula Borough Legal Notice

INVITATION TO BID ITB20-011 NIKISKI FIRE STATION NO. 3

The Kenai Peninsula Borough hereby invites qualified firms to submit a firm price for acceptance by the Borough for Nikiski Fire Station No. 3. The project consists of the following: Construction of a new, 7,600 SF square foot, two-story building to house a Fire Department. The project includes (5) vehicle bays serviced by (5) sectional overhead doors; an office, mezzanine exercise room, training room, storage, decontamination area, mechanical rooms; upstairs living quarters and kitchen. The site is undeveloped and will require an on-site well and septic system. Site improvements also include a new paved driveway, parking and fire station apron.

A pre-bid conference will be held at the Purchasing and Contracting Department, 47140 E. Poppy Lane, Soldotna, Alaska on October 10, 2019 at 12:30 PM. A site visit will follow at 3:30 PM at 47110 Holt Lamplight Rd (corner of Holt Lamplight and the Escape Route), Nikiski, Alaska. Attendance at the pre-bid is not mandatory but is strongly recommended. If you are unable to attend but would like to participate, we are offering the opportunity for you to call in and join the pre-bid meeting. The number to call is (907) 262-2044.

This contract is subject to the provision of State of Alaska, Title 36, Minimum Wage Rates. The subsequent contract will require certificates of insurance and may require performance and payment bonds.

Bid documents may be obtained beginning October 3, 2019 online at <u>http://www.kpb.us/purchasing/opportunities</u>. Hard copies can be picked up at the Purchasing and Contracting Department, 47140 East Poppy Lane, Soldotna, Alaska 99669, 907-714-2260 for a non-refundable fee of \$40.00.

One (1) complete set of the bid package may be submitted electronically through BidExpress.com or in hard copy to the Kenai Peninsula Borough, Purchasing and Contracting Department at 47140 E Poppy Lane, Soldotna, Alaska 99669. If submitting a hard copy bid, these forms must be enclosed in a sealed envelope with the bidder's name on the outside and clearly marked:

BID:	ITB20-011 NIKISKI FIRE STATION NO. 3		
DUE DATE:	November 6, 2019, no later than 2:00 PM		
Kenai Peninsula Borough			

Publish:	Peninsula Clarion	October 3, 2019
	Anchorage Daily News	October 3, 2019

INSTRUCTIONS TO BIDDER

1. GENERAL

These instructions specify the form and procedures for the submission of a complete and acceptable bid. (See Bid Form/Schedule.)

In an effort to make the solicitation process more efficient and cost effective for both vendors and the agency, the Kenai Peninsula Borough has adopted an electronic bidding process for Invitations to Bid and Requests for Proposal. Electronic bids/proposals may be submitted at the <u>BidExpress.com</u> website as the primary method of bid/proposal submission. For a limited time, paper bids/proposals will continue to be accepted, but it is strongly recommended vendors become familiar with the electronic process as soon as possible to prepare for future plans to only accept electronic bids/proposals.

2. EVIDENCE OF QUALIFICATIONS

Upon request of the Owner, a Bidder whose Bid is under consideration for the award of the Agreement shall submit promptly to the Owner satisfactory evidence of the Bidder's financial resources, their experience, their performance in completing other projects of a similar nature, and the organization and equipment they have available for the performance of the Agreement.

3. **BIDDER QUALIFICATIONS**

Before the Bid is considered for award, the Purchasing and Contracting Director reserves the right to determine whether or not a Bidder is responsible and to require the Bidder to complete a Bidder Qualification Form and/or a current financial statement prepared by a Certified Public Accountant. The Purchasing and Contracting Director shall determine whether a Bidder is responsible on the basis of the following criteria:

- The skill and experience demonstrated by the Bidder in performing Agreements of a similar nature.
- The Bidder's record for honesty and integrity.
- The Bidder's capacity to perform in terms of facilities, personnel, and financing.
- The Bidder's past performance under Borough Agreements. If the Bidder has failed in any material way to perform its obligations under any Agreement with the Borough, the Bidder may be determined as a non-responsible Bidder.
- A Bidder's representations concerning their qualifications will be construed as a covenant under the Agreement. Should it appear that the Bidder has made a material misrepresentation, the Borough shall have the right to terminate the Agreement for the Contractor's breach, and the Borough may then pursue such remedies as provided in the Contract Documents or as provided by state statute, borough code, or as appropriate.

Any determination that a Bidder is non-responsible will be made by the Purchasing and Contracting Director. Such determination will be made in writing to the Bidder setting forth the reasons for such determination. The Borough reserves the right to waive specific qualification requirements if in the best interest of the Borough.

4. CONDITIONS AFFECTING THE WORK

The Bidder shall examine carefully the site of the proposed work and the Bidding Documents before submitting a Bid. The submission of a Bid shall be an admission that the Bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements and accuracy of the Bidding Documents.

The Borough assumes no responsibility for any understanding or representations concerning conditions made by any of its officers, agents, or employees prior to the execution of this Agreement, unless such understanding or representations are expressly stated in the Bidding Documents or Addenda.

The Bidder shall include in their Bid sufficient sums to cover all items required by the Agreement and the conditions of the site(s), and shall rely entirely upon their own examination in making their Bid. The submission of a Bid shall be taken as prima facie evidence of compliance with this paragraph.

If material required for bidding purposes by these documents is absent, the bidder is required to notify the Purchasing and Contracting Director by facsimile (907) 714-2373, by e-mail to purchasing@kpb.us or by submitting the information/question through the online questions and answers process at BidExpress.com.

5. SECURITY TO BE FURNISHED BY BIDDER

If the bid exceeds \$100,000 the following apply: Certified check, bank cashier's check, or bid bond, made payable to the Kenai Peninsula Borough amount equal to five (5%) percent of the total bid, shall accompany each bid as evidence of good faith, a guarantee that if awarded the contract, the Bidder will execute the contract and give bond as required. All Bidder's checks or bid bonds will be retained until the successful bidder has entered into a satisfactory contract and furnished bonds, as required. Bidders who are bidding online may utilize the electronic bid bond option through the BidExpress.com. The successful Bidder shall furnish the Owner a Performance and Payment bond in the full amount of the Agreement and shall maintain the Bond in force during the continuance of the Agreement. The bonds must be furnished prior to the Owner's execution of the contract. The Bond shall be for the faithful performance of the Agreement in all respects including, but not limited to, payments for all materials and labor. All alterations, extensions of time, additional work, and other changes authorized by the Agreement Documents may be made without securing the consent of the Surety or Sureties. Power-of-Attorney for the person signing the Bond for the Surety must be submitted with the Bond. These bonds, in whatever amount required by the specific contract, shall be administered and deemed governed by the provisions of Alaska Statutes Title 36, Chapter 25, and shall comply with all requirements for payment and submission of claims as provided by that chapter.

6. LICENSING

Section 43.70.020 of the Alaska State Statutes requires that all businesses wishing to engage in business in Alaska obtain a license. All bidders are required to furnish, on the Bid Form, a current, valid Alaska Business License Number and, if applicable, a current, valid Contractor's License Number, Specialty Contractor License Number, etc. Failure to submit all required information on the Bid Form may result in rejection of the Contractor's bid.

7. TAX COMPLIANCE CERTIFICATE

Kenai Peninsula Borough Code requires that businesses or individuals contracting to do business with the Kenai Peninsula Borough be in compliance with Borough tax provisions. No contract will be awarded to any individual or business who is found to be in violation of the Borough Code of Ordinances in the several areas of taxation. The *Tax Compliance Certificate* must be signed by the bidder and submitted with the bid. (Note: Tax Compliance Certificates are not required to be approved by the Boroughs Finance Department prior to submitting a bid.)

8. LOCAL PREFERENCE

A 5 percent local preference policy has been established and may be applied to all purchases under \$50,000. A local business is defined as: any business or company having a physical presence in the Borough, registered in the Borough to collect sales tax, and locally provides the products and services sought.

9. INTERPRETATION OR CORRECTIONS OF BID DOCUMENTS

Bidders shall notify the Purchasing and Contracting Director promptly of any error, omission, or inconsistency that may be discovered during examination of the Bid Documents and the proposed work site. Requests from Bidders for interpretation or clarification of the Bid Documents shall be made in writing to the Purchasing and Contracting Director and shall arrive no later than 5:00 PM on October 23, 2019. Questions may be submitted through the online questions and answers section of this bid on BidExpress.com, faxed to (907) 714-2373 or emailed to <u>purchasing@kpb.us</u>. The subject line of the email should read, "Questions: ITB20-011 Nikiski Fire Station No. 3."

Oral questions may be presented at a pre-bid conference if one is provided for in the Bid Documents. Interpretations, corrections, material substitution requests or changes, if any, to the Bid Documents shall be made by Addendum. Bidders shall not rely upon interpretations, corrections, and changes made in any other manner, including orally, at the pre-bid conference. Interpretations, corrections, and changes shall not be binding unless included in an Addendum. All Addenda issued during the time of bidding shall become part of the Agreement Documents. Questions or requests for clarifications shall be directed to the Borough's Purchasing and Contracting Director. Questions or requests for clarification directed to any other member of the Borough staff may be grounds for rejection of the bid as being irregular. Only written interpretations or corrections by addendum shall be binding, and no other forms of interpretation or correction will be binding on the Borough.

It is the Bidder's sole responsibility to ascertain that they have received all Addenda issued by the Purchasing and Contracting Office. Addenda will be issued electronically and/or by facsimile. All Addenda must be acknowledged in the space provided on the Bid Form. If no Addendum has been issued, leave blank or write or type "N/A" on the Bid Form in the space provided.

10. PREPARATION AND SUBMISSION OF BIDS

- Bids must be received by no later than the time and at the place stated in the Invitation to Bid (Kenai Peninsula Borough Purchasing & Contracting Department, 47140 E Poppy Lane, Soldotna, Alaska 99669).
- Paper bids must be submitted on the bid form furnished. Paper bids must be completed in ink or by typewriter, and must be manually signed by an authorized person. If erasures or other changes appear on the forms, the person signing the bid must initial each erasure or change in ink.
- Bids shall specify a unit or lump sum price, typed or written in ink in figures, for each bid item called for. In case of error in the extension of prices, the unit price will govern. Bids may be rejected if they show any omissions, alteration of the forms, additions not called for, conditional or alternate bids not called for, qualified bids, or irregularities of any kind.
- It is expressly agreed that the quantities shown in the Bid Schedule, whether for a "Unit Price Bid" or in connection with a "Lump Sum Bid" given under the heading "Bid Schedule" are approximate only for use as a basis for comparison of Bids and are not to be taken to be either representations or warranties. The Owner does not expressly, nor by implication, agree that the actual amount of work will correspond therewith.
- The Bid Schedule invites bids on definite plans and specifications. Only the amounts and information asked for on the Bid Schedule will be considered as the bid. Each bidder shall bid upon the work exactly as specified and as requested on the Bid Schedule, and bidders shall bid upon all alternates as indicated. When bidding on an alternate for which there is no charge, Bidder Shall Write the words "no charge" in the space provided.
- Electronic bids may be submitted by following the submission process through BidExpress.com. All bidders planning to submit bids electronically must first register on BidExpress.com and create an Info Tech Digital ID, which is used to digitally sign bids.
- If submitting a paper bid, one (1) complete set of the bid package (which shall include the Bid Form, Tax Compliance Certificate, and bid schedule, if applicable) shall be completely sealed in an envelope clearly marked with the Bidder's company name and the following:

Bid for:	ITB20-011
	NIKISKI FIRE STATION NO. 3
Due Date:	November 6, 2019 no later than 2:00 pm

- Bids received without all the required documents may be considered non-responsive. Bids received after the closing time will be considered non-responsive and will not be read.
- No responsibility shall be attached to the owner for the premature opening of, or the failure to open a bid not properly addressed and identified.
- Please note that overnight delivery from the lower 48 states is generally not available. Prospective bidders should anticipate a minimum of two (2) to three (3) days' delivery time for express, priority or expedited delivery services.
- Please note that it can take up to five (5) business days to activate a digital signature for electronic bids and process your Digital ID. It is highly recommended that a Digital ID be enabled a minimum of 48 hours in advance of submitting an electronic bid.

11. MODIFICATION OF BIDS

Bid modifications will be accepted by the Borough, and binding upon the Bidder, where the modification:

- Is received by the Owner at the place designated for submission of bids prior to the deadline.
- Is sealed in an envelope clearly stating "Bid Modification," the name of the project, and the Bidder's company name.
- Is signed by the same individual who signed the original bid.

Should there be more than one bid modification from a Bidder, the last modification received prior to the deadline shall be opened and applied to the bid. All earlier modifications shall be returned to the Bidder unopened.

Modifications to electronically submitted bids may be made any time prior to the bid deadline using BidExpress.com.

Any modification which fails to meet any requirement of this section shall be rejected, and the bid shall be considered as if no modification had been attempted.

12. WITHDRAWAL OF BID

At any time prior to scheduled closing time for receipt of bids, any bidder may withdraw their bid, either personally or by written request.

After the scheduled closing time for receipt of bids, no bidder will be permitted to withdraw their bid unless Notice of Award is delayed for a period exceeding forty-five (45) days.

A bid may not be withdrawn after opening without the written consent of the Borough.

13. ACCEPTANCE – REJECTION OF BIDS

The Borough reserves the right to reject any or all bids, to waive minor irregularities in any bids or in the bidding procedure, and to accept any bid presented which meets or exceeds said specifications and which is deemed to be in the best interest of the Borough. However, the requirements for timeliness and manual signatures shall not be waived. The Borough is not obligated to accept the lowest bid and is not responsible for bid preparation costs.

If any bidder has interest in more than one bid, all bids in which such bidder has interest shall be rejected.

14. EXECUTION OF CONTRACTS

The successful bidder shall be required to execute a contract for the work within ten (10) days after receiving the contract documents from Owner; if Contractor does not return executed copies within this time, then, at the option of Owner, the bid may be rejected.

15. AWARD OF CONTRACT

It is the intent of the Borough to award the bid to the lowest, qualified, responsive and responsible bidder. Unless otherwise stated in the Bid Documents, the Agreement, if awarded, shall be awarded to the responsible Bidder who submits the lowest responsive bid. When Bid Documents contain a base bid and alternates, only the total of the base bid and the alternates to be awarded shall be used to determine the low bidder.

When the Bid Documents contain additive or deductive alternates, the apparent low Bidder will be determined by the lowest base bid plus additive, or less deductive alternates. Owner is not required to award any alternate and may choose all, none, or some of the alternates as it deems in its best interest. If the order of bidders would not be affected, Owner has the right to select any alternate or combination of alternates. If the order of bidders would be affected, award will be based on the base bid plus the additive, or less the deductive alternates, in the order provided on the bid schedule, until the award can be made within the available funds. Award will be subject to the availability of funds, which is determined solely by Owner.

The amount of the Agreement shall be the total sum of the amounts computed from the estimated quantities and unit prices and/or the lump sum awarded by the Purchasing and Contracting Director and specified in the Agreement.

On all Bids, Notice of Award or rejection will be given within forty-five (45) days of Bid opening. The notice will be in writing and signed by the Purchasing and Contracting Director. A Notice of Intent to Award, and no other act of the Borough or its representatives, constitutes an acceptance of a Bid. The acceptance of a Bid shall bind the successful Bidder to execute the Agreement.

16. TIMELINE

Advertise for Bids	October 3, 2019
Pre-Bid Meeting	October 10, 2019
Final Questions Due, by close of business	October 23, 2019
Bids Due at KPB Purchasing and Contracting Office, 47140 E Poppy Lane,	
Soldotna, Alaska 99669, no later than 2:00 PM	November 6, 2019
Substantial Completion	ays from Notice to Proceed

17. CONFLICTS OF INTERESTS

No member of the governing body of the Kenai Peninsula Borough or other officer, employee or agent of the Borough who exercises any functions or responsibilities in connection with the carrying out of the project shall have any personal interests, direct or indirect, in any ensuing contract as a result of this Invitation to Bid, **without first disclosing his/her potential conflict**, **by submitting a letter to the Borough Clerk's Office establishing their "intent to do business with the Borough" (KPB 2.58.050)**. The contractor for itself and its principal employees, officers, agents, directors or shareholders covenants that neither the contractor nor any of the listed classes of individuals has nor shall acquire any interest, direct or indirect, in the project, direct or indirect, to which the contract pertains which would conflict in any manner or degree with the performance of its work hereunder. The selected bidder further covenants that in its performance of the contract no person having such interest shall be employed, **without first disclosing his/her potential conflict**.

18. APPEAL PROCESS

A bidder adversely affected by the provisions of Chapter 5.28 of the KPB Code, or regulations promulgated thereunder, or by any acts of the Borough in connection with the award of this contract may file a bid protest personally received at the office of the Borough Purchasing and Contracting Director within three (3) business days after the notice of intent to award is provided. This appeal must comply with the requirements of KPB 5.28.320 of the Borough code and may be hand delivered, delivered by mail, or by facsimile at (907) 714-2373. A fee of \$300 shall be paid to the Borough and must be received by the deadline for filing the written appeal. This fee shall be refundable if the appellant prevails in the appeal to the mayor or assembly.

BID FORM ITB20-011 NIKISKI FIRE STATION NO. 3 Page 1 of 2

 BIDDER ACKNOWLEDGEMENT To accept the provisions of the Instructions to Bidders. To furnish all labor and materials and to accomplish the works and/or services in accordance with the Bid Documents. The undersigned declares, under penalty of perjury under the laws of the United States, that neither he/she nor the firm, association or corporation of which he/she is a member, has, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this bid. 						
ADDENDA ACKNOWLEDGEMENT						
In submitting this bid, I certify that I have examined the Bid and Specification documents, have received Addenda Nos.						

SIGNATURE REQUIREMENT					
Firm Name					
Address					
<u>City</u>	State	Zip			
Representative	Title				
Email Address					
Telephone	Fax				
The undersigned has read the foregoing and hereby agrees to the conditions stated therein by affixing his/her signature below:					
Signature of Authorized Company Representative Date					
Bidder Checklist: Bid Form: Bid Schedule (if applicable)	Enter Licensing Information: Alaska Business License # Contractor License (if applicable) #				

Tax Compliance Form ____ Bid Bond (if applicable) ____ Specialty Contractor License # (if applicable) _____

BID FORM ITB20-011 NIKISKI FIRE STATION NO. 3 Page 2 of 2

BID SHEET

BASE BID (materials and labor as required to complete the project):	<u>\$</u>
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ADDITIVE ALTERNATE #1 (Work proposed on gasoline and diesel fuel tanks).

\$

TOTAL OF BASE BID AND ADDITIVE ALTERNATE #1 §

Company Name

Tax Com	pliance Cei	rtificatio	on	Γ	
Kenai F Finc	'eninsula B ince Departm	oroug nent	n		
144 N. Binkley Street Soldotna, Alaska 99669-7599 www.kpb.us		Phon c Fo	e: (907) 714- or: (907) 714- x: (907) 714-	2197 2175 2376	
1.) Fill in all information requested.	2.) Sign and date. 3.)	Submit with	solicitation, or	other.	For Official Use Only
Reason for Certificate:		-	For Departm	ent:	
Solicitation Other:			Dept. Conta	ct:	
Business Name:					
Business Type:	🗌 Individual 🗌	Corporatio	n 🗌 Partne	ership	Other:
Owner Name(s):					
Business Mailing Address:					
Business Telephone:			Business Fax:		
Email:					
several areas of taxation.					
REAL/PERSONAL/BUSINESS PROP ACCT. NO.	ACCT. NAME		TAX ACCO	unts/status (* AID	O BE COMPLETED BY KPB) BALANCE DUE
KPB Finance Department (signature	required)	Dc	te		
SALES TAX ACCOU ACCT. NO.	NTS ACCT. NAME		TAX ACCOL FILED THRU	UNTS/STATUS (1 M/F's	O BE COMPLETED BY KPB) BALANCE DUE
KPB Sales Tax Division (signature rec	quired)		te	_ 🗌 In Com	pliance 🗌 Not in Compliance
CERTIFICATION: 1,	f Applicant) nformation is correc	thet thet as of	(Title) 	,	hereby certify that, to the
				Signature a	f Applicant (Required)

IF ANY BUSINESS IS CONDUCTED OR IS AWARDED A BID WITHIN THE KENAI PENINSULA BOROUGH YOU MUST BE REGISTERED TO COLLECT SALES TAX. THE SALES TAX DEPARTMENT CAN BE REACHED AT (907) 714-2175.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned, _____

______, as Principal, and ______, as Surety, are hereby held and firmly bound unto _______, as the OWNER in the penal sum of _______ for the payment of which, well and truly made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed this	day of		, 20	The	Princip	al has	submi	tteo	d to		
	a certain BID,	attached	hereto and	hereby	made a	a part	hereof	to	enter	into	а
contract in v	vriting for the _			_		•					

NOW, THEREFORE,

- (a) If said BID shall be rejected or
- (b) If said BID shall be accepted and the principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID), and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID,

Then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agree that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)

Principal

Surety

Ву: _____

IMPORTANT- - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

PART II

CONTRACT DOCUMENTS

KENAI PENINSULA BOROUGH AGREEMENT BETWEEN OWNER AND CONTRACTOR

MADE AS OF THE	DAY OF	20
		20

BETWEEN the OWNER: KENAI PENINSULA BOROUGH 144 North Binkley Street Soldotna, Alaska 99669

AND the CONTRACTOR:

FOR the PROJECT:

ITB20-011 NIKISKI FIRE STATION NO. 3

The Owner and Contractor agree as set forth below.

ARTICLE 1 THE WORK

The Contractor shall perform all the work required by the Contract Documents enumerated below, which are specifically incorporated into this Agreement by reference and which, along with this Agreement, form the "Contract Documents":

- A. Invitation to Bid (Attachment "A").
- B. The Contractor's executed bid, dated _____ (Attachment "B").
- C. The General Conditions (GC) for Project (Attachment "C").
- D. Addendum No. ____ (Attachment "D").
- E. Specifications and Drawings (Attachment "E").
- F. Drawings (Attachment "F").
- G. Any and all later modifications, change orders and written interpretations of the Contract Documents issued by the Owner and agreed to by Contractor. (Attachment "G").

Any other attachments to this agreement do not form a part of the agreement but are for reference or proof of compliance with the requirements of the agreement.

ARTICLE 2 TIME OF COMMENCEMENT AND COMPLETION

Work shall commence upon receipt of the Notice to Proceed. All work must be substantially completed within ______ days after the date of the Notice to Proceed ("Contract Time"). All time requirements set forth in the Contract Documents are of the essence, and liquidated damages will be charged against the Contractor as provided in Article 10, below.

ARTICLE 3 CONTRACT SUM

The Owner shall pay the Contractor as provided in this contract the total sum price of \$_______ for the successful completion of the specified work.

The Contractor warrants that the Contract Sum is reasonable compensation for the work and the above provided time of completion of the work is adequate for the performance of the work as represented by the Contract Documents, bidding documents, and the General Conditions (including but not limited to weather, site, soil) known or reasonably anticipated for the site.

ARTICLE 4 PROGRESS PAYMENT

Based upon applications for payment submitted by the Contractor, the Owner shall provide for Progress Payments to the Contractor on a monthly schedule. Upon proper application submitted no later than ten (10) days prior to the next scheduled Contractor payday, the Contractor shall be paid for the value of the work performed and materials stored at the site during the period preceding payment. Each application for progress payment shall be on an approved Application for Payment form and shall contain a completed Schedule of Values. All sums properly due shall be paid within thirty (30) days of receipt of application. Prior to final payment, the Contractor shall submit the written consent of surety to such payment and shall submit notarized waivers of lien from all materialmen and subcontractors.

ARTICLE 5 FINAL PAYMENT

The Owner shall make final payment within thirty (30) days after issuance of a Certificate of Final Completion of the work subject to provisions of the General Conditions. The Certificate of Final Completion acknowledges that all work required by the Contract Documents has been completed in accordance with the requirements of the contract. The Contractor shall request the final inspection at least five (5) days in advance of the anticipated date of inspection. If all work has

not been satisfactorily completed, the Contractor shall be liable for all costs incurred by the Owner in making such inspection.

ARTICLE 6 NOTICES

All legal notices relating to this contract, including changes of address, shall be mailed to the Owner and the Contractor at the following addresses:

<u>OWNER</u>

CONTRACTOR

Kenai Peninsula Borough Purchasing and Contracting Department 47140 East Poppy Lane Soldotna, Alaska 99669

ARTICLE 7 INDEMNIFICATION

No provision in the Contract Documents lessens, alters, or makes inapplicable the requirement for indemnification stated in GC 4.13. In the event of conflict between GC 4.13 and any other contract provision(s), the requirements set out in GC 4.13 control.

ARTICLE 8 JURISDICTION: CHOICE OF LAW

This contract shall be governed by the laws of the State of Alaska, and any lawsuit brought thereon shall be filed in the Third Judicial District at Kenai, Alaska.

ARTICLE 9 ATTACHMENTS

In the event there is any difference between an attachment to the original of this agreement on file with the Kenai Peninsula Borough Clerk and any attachment to a copy of the agreement, the attachments to the original filed with the Borough Clerk shall control.

ARTICLE 10 LIQUIDATED DAMAGES

Owner and Contractor recognize that time is of the essence in performance of this contract and the Owner will suffer financial loss if the work is not substantially complete within the time specified above, plus any extensions thereof allowed in accordance with the Contract Documents.

The parties also recognize the delays, expense and difficulties involved in proving the actual loss suffered by Owner if the work is not substantially complete on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty or as a limitation of remedies in the event of default) Contractor shall pay Owner <u>Three Hundred Dollars (\$300.00)</u> for each calendar day that expires after the contract time required for substantial completion to the actual date of Substantial Completion determined as set out in the Contract Documents. The Owner and Contractor agree that this amount is a reasonable forecast of just compensation for the harm that is caused by the delay. The per diem amount above may be construed as the actual amount of damages for delay sustained by the Owner, and may be retained by the Owner and deducted from payments to the Contractor.

ARTICLE 11 NO THIRD-PARTY BENEFICIARY

This agreement is intended solely for the benefit of each party hereto. Nothing contained herein shall be construed or deemed to confer any benefit or right upon any third party.

IN WITNESS WHEREOF, the parties have caused this agreement to be executed in their respective names or by their duly authorized representatives as of the date and year above written.

KENAI PENINSULA BOROUGH

CONTRACTOR

Charlie Pierce, Borough Mayor

Date:

Name and Title of Office (printed or typed)

Company Name (printed or typed)

Signature Date:

Name and Title of Second Officer (printed or typed)^1 $% \left(\left({{{\mathbf{F}}_{i}}^{2}} \right)^{2} \right)^{2} \right)$

¹ 1st signing Corp. Officer should be Pres or VP; 2nd Officer should be signed by Secretary or Treasurer

	Signature Date:
ATTEST:	AGREEMENT AND ATTACHMENTS TO ORIGINAL APPROVED AS TO FORM AND LEGAL SUFFICIENCY:
Johni Blankenship, Borough Clerk	Patty Burley, Assistant Borough Attorney
(Borough Seal)	
A	<u>CKNOWLEDGMENTS</u>
STATE OF ALASKA)	
) THIRD JUDICIAL DISTRICT)	SS.
The foregoing instrument was 20, by municipal corporation, for and on beh	acknowledged before me this day of , Mayor of the Kenai Peninsula Borough, an Alaska alf of the corporation.
(Notary Seal)	Notary Public for State of Alaska My Commission Expires:
	CORPORATION
STATE OF ALASKA)	
THIRD JUDICIAL DISTRICT)	55.
The foregoing instrument was 20, by (name)	acknowledged before me this day of, the <u>(title of officer)</u>
Alaska Corporation, for and on behalf	of the corporation.
	Notary Public for State of Alaska

		My Commission Expires:	
(Notary Seal)			
SE		ORPORATE OFFICER	
STATE OF ALASKA)		
THIRD JUDICIAL DISTRICT)		
The foregoing instrument v 20, by <u>(name)</u>	was ackno	owledged before me this day of _ _, the <u>(title of officer)</u>	
of (name of corporation)			, an Alaska
Corporation, for and on behalf of	the corpc	oration.	
(Notary Seal)		Notary Public for State of Alaska My Commission Expires:	
LI STATE OF ALASKA	(MITED L)	IABILITY COMPANY	
THIRD JUDICIAL DISTRICT) ss.)		
The foregoing instrument	was ackno	owledged before me this day of	
20, by <u>(name)</u>		, the <u>(member/manager)</u>	
of (name of LLC)		, an Alaska Lin	nited Liability
Company, for and on behalf of the	e LLC.	Notary Public for State of Alaska	
		My Commission Expires:	
(Notary Seal)			
	PA	ARTNERSHIP	
)) ss.		
)		

The foregoing instrument was acknowledged before me this	day of
20, by (name of partner or agent)	, partner (or agent) of
(name of partnership)	for and on behalf of
the partnership.	

Notary Public for State of Alaska My Commission Expires: _____

(Notary Seal)

SOLE OWNERSHIP

)) ss.

)

STATE OF ALASKA

_.

THIRD JUDICIAL DISTRICT

The foregoing instrument was acknowledged before me this ____ day of _____ 20___, by (name) _____, dba _____

> Notary Public for State of Alaska My Commission Expires: _____

(Notary Seal)

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

Name of Contractor)	
(Address of Contractor)	
a (Corporation, Partnership, Limited Liability Company or Individual)	, hereinafter called Principal, and
(Name of Surety)	
(Address of Surety)	
hereinafter called Surety, are held and firmly bound unto	
(Name of Owner)	
(Address of Owner)	
hereinafter called Owner, in the penal sum of (\$) in lawful money of the United States, for the pa be made, we bind ourselves, our heirs, executors, administrators and suc these presents.	Dollars, ayment of which sum well and truly to cessors, jointly and severally, firmly by
THE CONDITIONS OF THIS OBLIGATION is such that whereas, the Princip the Owner, dated the day of, 20, a copy of which hereof for the construction of:	bal entered into a certain contract with n is hereto attached and made a part

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of said work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or other-wise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change,

extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any ways affects its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, who claims may be unsatisfied.

	(Principal)	(SEAL)
	(Principal Secretary)	
ATTEST:	BY	
(Witness as to Principal)	(Address)	
(Address)		
(Date)		
	(Surety)	(SEAL)
ATTEST:	BY(Attorney-in-	-Fact)
(Witness as to Surety)	(Adc	dress)
(Addross)		
(Address) 		
NOTE: If Contractor is Partnership, all partners	should execute bond.	

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that
(Name of Contractor)
(Address of Contractor)
a, hereinafter called Principal, and
(Corporation, Partnership, Linnited Liability Company of Individual)
(Name of Surety)
(Address of Surety)
hereinafter called Surety, are held and firmly bound unto
(Name of Owner)
(Address of Owner)
hereinafter called Owner, in the penal sum of Dollars, (\$) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.
THE CONDITIONS OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, dated the day of, 20, a copy of which is hereto attached and made a part hereof for the construction of:

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed

thereunder or the specifications accompanying the same shall in any ways affects its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, who claims may be unsatisfied.

	(Principal)	(SEAL)
	(Principal Secretary)	
ATTEST:	BY	
(Witness as to Principal)	(Address)	
(Address)		
(Date)		
	(Surety)	(SEAL)
ATTEST:	BY(Attorney-in-F	act)
(Witness as to Surety)	(Address)	
(Address)		
(Date)		
NOTE: If Contractor is Partnership, all partne	ers should execute bond.	

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

CONTRACTOR'S RELEASE AND AFFIDAVIT OF PAYMENTS OF DEBTS AND CLAIMS ("Release")

PROJECT NUMBER & NAME:

CONTRACTOR/SUBCONTRACTOR:

The undersigned, being first duly sworn, deposes and says:

1. That pursuant to this contract for project ______ between the undersigned and the Kenai Peninsula Borough dated ______ the undersigned hereby certifies that, except as listed below, he has paid in full or has otherwise satisfied all obligations for materials and equipment furnished for all work, labor, and services performed and for all known indebtedness and claims for which the Contractor or the Kenai Peninsula Borough is or may become liable in connection with performance under this contract. The Contractor warrants that he has made diligent search and inquiry to determine the existence of any such claim, debt, or liability and that all such obligations, whether liquidated, unliquidated, or disputed, have been satisfied.

2. The Contractor further certifies he did not extend any loan, gratuity, or gift of money of any form whatsoever to any employee or agent of the Borough, that he did not rent or purchase any equipment or materials from any employee of the Borough, nor to the best of his knowledge, from any agent of any employee of the Borough, and that he has not made any promise to an employee or agent of the Borough to do or undertake any such action after completion of the subject contract.

3. Pursuant to the above-described contract and in consideration of the final payment in the amount of \$______, the undersigned Contractor hereby releases and discharges the Kenai Peninsula Borough, its officers, agents and employees of and from any and all further claim, debt, charge, demand, liability, or other obligation whatsoever under or arising from said contract, whether known or unknown and whether or not ascertainable at the time of the execution of this instrument.

4. The Contractor shall indemnify, defend, save and hold the Borough, its elected and appointed officers, agents and employees, harmless from any and all claims, demands, suits, or liability of any nature, kind or character including costs, expenses, and attorneys fees resulting from Contractor or Contractor's officers, agents, employees, partners, attorneys, suppliers, and subcontractors' performance or failure to perform this Agreement in any way whatsoever. This defense and indemnification responsibility includes claims alleging acts or omissions by the Borough or its agents which are said to have contributed to the losses, failure, violations, or damage. However, Contractor shall not be responsible for any damages or claim arising from the sole negligence or willful misconduct of the Borough, its agents, or employees. Contractor and subcontractors shall also not be required to defend or indemnify the Borough for damage or loss that has been found to be attributed to an independent contractor directly responsible to the Borough under separate written contract.

If any portion of this Release is voided by law or court of competent jurisdiction, the remainder of this Release shall remain in full force and effect.

IN WITNESS WHEREOF, this Release has been executed this _	of 20
---	-------

Name and Title of Office (printed or typed)

Company Name (printed or typed)

Contractor's Signature

STATE OF ALASKA)) ss THIRD JUDICIAL DISTRICT)

THIS IS TO CERTIFY that on this _____ day of _____, 20_, before the undersigned, a Notary Public in and for the State of Alaska, duly commissioned and sworn, personally appeared _____, who, having produced satisfactory evidence of identification, and having acknowledged the voluntary and authorized execution of the foregoing instrument for the purposes therein mentioned, executed the above and foregoing instrument.

Notary Public for Alaska My Commission Expires: _____

PART III

CONTRACT CONDITIONS

GENERAL CONDITIONS OF THE CONTRACT BETWEEN OWNER AND CONTRACTOR

ARTICLE 1 DEFINITIONS AND CONTRACT DOCUMENTS

1.1 Definitions

- A. The terms "Architect" or "Engineer" (hereinafter used interchangeably) shall mean the person or entity contracted by the Kenai Peninsula Borough to provide design services for the project. Architect or Engineer also includes employees of the Architect or Engineer. Architect shall provide professional services during construction as described herein below or as authorized by Owner.
- B. The term "contract" or the "Contract" means the entire integrated master agreement between the Contractor and the Owner.
- C. The term "Contractor" means the person or entity identified in the Agreement which has contracted with Owner to perform the work of the contract. This definition includes a responsible officer of Contractor's organization or its authorized representative who shall be made known to Owner.
- D. The term "Contract Documents" consist of documents designated as Contract Documents and enumerated in the Agreement between Owner and Contractor.
- E. The term "Contract Sum" means the total sum contract prices as stated in Article 3 of the Agreement between Owner and Contractor.
- F. The term "Contract Time" means the date the Contractor agrees the work will be substantially completed by as stated in Article 2 of the Agreement between Owner and Contractor.
- G. The terms "Final Completion" means the finalization of the construction phase formalized when the Project Representative prepares and recommends that Owner issue a Certificate of Final Completion and Final Payment to Contractor.
- H. The term "Project" refers to the overall construction, of which the work required by the contract may be the whole or may be a part.
- I. The term "Project Representative" shall mean a person or entity employed by or under contract to Owner to be Owner's on-site designated representative. The term Project Representative shall include the Project Representative's employees.
- J. The term "Substantial Completion" means the state of construction at which the work is sufficiently complete and in accordance with the Contract Documents, so that Owner could occupy and utilize the work or a specific portion of it, for its intended use.
- K. The term "Warranty Period" refers to the one-year warranty period following the Substantial Completion.
- L. The term "Work" includes all procurement, labor, materials, products, equipment, erection, installation, and alterations necessary to complete the construction envisioned by this contract.

- 1.2 The Contract Documents consist of documents designated as Contract Documents and enumerated in the Agreement between Owner and Contractor. The Contract Documents enumerated in the Agreement between Owner and Contractor form the final and completely integrated contract between the parties and supersede any prior statements, negotiations, agreements, documents or representations, written or oral. What is required by any one contract document is deemed to be required by all documents.
- 1.3 The Contract Documents do not include Invitation to Bid, Instructions to Bidder, sample forms, portions of Addenda relating to any of these, or any other documents unless specifically enumerated in Agreement between Owner and Contractor.
- 1.4 Unless specifically provided otherwise in the Contract Documents the parties to this agreement intend that Contractor will obtain all permits, inspections, tests, bonds, and insurance required by state or federal law, rule, regulation or order, or local ordinance or rule or regulation or the Contract Documents, whichever requirement is greater, and provide all labor, equipment, transportation, water, heat, utilities, tools, scaffolding, materials, supplies, facilities, and services necessary for performance of the contract and that the cost of these requirements be included within the contract price. The parties further intend that the cost of all overhead, supervision, and other incidental expenses required or occasioned by the contract is included in the contract price. The parties also intend that minor items required to produce complete functional system(s) and sub-system(s) are deemed to be required by the Contract Documents at the contract price whether or not specifically expressed. The requirements stated in this provision apply whether or not the execution or completion of the work is temporary or permanent and whether or not it is incorporated or to be incorporated in the work or final product.
- 1.5 The requirements of the Contract Documents and the duties and rights of each party may be amended subsequent to execution of this contract only by:
 - A. A written amendment to the contract signed by both parties; or,
 - B. A change order issued pursuant to ARTICLE 9.1
- 1.6 The contract between Owner and Contractor shall be executed and returned by Contractor within the time required in the instructions to bidders. A written Notice to Proceed with the work will be issued to Contractor within five (5) days after Owner has executed the contract, except as provided in ARTICLE 4.1.3.
- 1.7 Should any provision or requirement of one portion of the Contract Documents conflict with any other portion of the Contract Documents, unless otherwise provided herein, the conflict will be resolved by reference to the Contract Documents in the following order of priority:
 - A. Valid change orders control over previous change orders, the agreement, addenda, supplementary conditions, general conditions, specifications, and drawings;
 - B. The agreement shall control over addenda, supplementary conditions, general conditions, specifications, and drawings;
 - C. Addenda pertaining to general conditions control over supplementary conditions and general conditions. Addenda pertaining to specifications and drawings control over specifications and drawings;
 - D. Supplementary conditions control over general conditions, specifications, and drawings;

¹ Unless otherwise stated, all references to an ARTICLE refer to the articles of these general conditions.

- E. General conditions control over specifications and drawings;
- F. Specifications control over drawings.
- 1.8 In case of difference between small and large scale drawings, the large scale drawings shall govern. Schedules on any contract drawing shall take precedence over conflicting information on that or any other contract drawing. On any of the drawings where a portion of the work is detailed or drawn out and the remainder is shown in outline, the parts detailed or drawn out shall apply also to all other like portions of the work.
- 1.8 In the event Contractor believes a discrepancy exists in the Contract Documents, Contractor shall submit the issue to the Project Representative together with Contractor's proposed course of action for performance of the work. Project Representative shall respond within seven (7) working days or advise Contractor that a response cannot be given within that time. If response will take more than seven (7) working days, Project Representative shall take steps to provide a response within a reasonable time. Any action taken by Contractor prior to or without Owner's response shall be at Contractor's own risk and expense.
- 1.10 Words and abbreviations which are not defined in the Contract Documents, but which have well known technical or trade meanings, shall be construed in accordance with the common meaning established by sound architectural or engineering practice in the State of Alaska.
- 1.11 Drawings, Specifications, other documents prepared for this project, and copies of them that are furnished by Owner and/or Architect or Consultant for this project, whether or not the documents or project are completed, shall be the property of Owner. All rights of use are reserved to Owner for this project and any subsequent project in which Owner participates in construction. Owner specifically relieves Architect or Consultant of any responsibility or liability pertaining to any subsequent use of the documents, in whole or in part, where those documents bear the stamp of a subsequent Architect or Consultant and are used for a subsequent project.
- 1.12 Up to fifteen (15) sets of full-size contract drawings and project manuals will be furnished the Contractor without charge. Additional sets will be furnished on request at the cost of reproduction, plus postage and handling if necessary. Contractor shall check all documents furnished immediately upon receipt and shall promptly notify Owner of any discrepancies.
- 1.13 The Contract Documents shall not be construed in any way as limiting Contractor's responsibility to perform the work completely, nor shall any prior customs or trade practices be held to constitute a waiver of the requirements of the Contract Documents or any portion of them.
- 1.14 The individual(s) executing the contract represent that they have the legal authority to execute the contract as or on behalf of Contractor in accordance with the bid instructions and the Contract Documents.
- 1.15 Execution of the contract by Contractor is a representation that Contractor has visited the site, become familiar with the local conditions under which the work is to be performed, has correlated personal observations with the requirements of the Contract Documents and enters this contract with knowledge of those conditions.

ARTICLE 2 ADMINISTRATION OF THE CONTRACT

2.1 Project Representative will provide administration of this contract and all communication made to Owner, Architect or Engineer by Contractor shall be made through Project Representative.

- 2.2 Project Representative will be Owner's primary representative during construction until final payment has been made and the project has been closed out. Owner's instructions to Contractor shall be made through Project Representative, who shall have authority to act on behalf of Owner to the extent set forth in this contract.
- 2.3 Project Representative shall not have the authority to require additional work, changes in the work, modifications or waivers of the rights, work or duties required by the Contract Documents or the right to bind Owner to any change in specifications or drawings without the written consent of Owner except as provided herein.
- 2.4 Project Representative may have authority to negotiate minor deviations in the requirements of the Contract Documents by Field Order. Field Orders are to be incorporated into a subsequent Change Order.
- 2.5 Project Representative will render interpretations of the Contract Documents necessary for the proper execution or progress of the project. All interpretations and decisions of Project Representative shall be consistent with the intent of the Contract Documents and shall be in writing.
- 2.6 Matters relating to design will be referred to the design Architect whose decisions will be consistent with the intent of the Contract Documents and will be final.
- 2.7 Project Representative, Architect, and authorized representatives of Owner shall have access to the project site and to the work at all times and shall be afforded every reasonable facility for ascertaining whether or not the work is in accordance with the requirements and intent of the Contract Documents.
- 2.8 All claims, disputes and other matters in question between Contractor and Owner relating to the execution or progress of the work shall be resolved pursuant to ARTICLE 12.
- 2.9 Project Representative shall have the authority: 1) to reject work which does not conform to the Contract Documents; 2) to require additional inspections or testing of any work during, prior to, or after fabrication, installation, or completion; 3) to specify both remedial work necessary to correct defective work and the time within which such work must be performed.
- 2.10 On the basis of on-site observations and inspections Project Representative will keep Owner informed of the progress of the work, and will endeavor to guard Owner against defects and deficiencies in the work. If Project Representative determines that any construction method, sequence, material, technique, safety precaution, act or omission of Contractor, Contractor's subcontractors, suppliers, or any of their agents, is detrimental to the progress, quality or safety of the work or to Owner's interest, then Project Representative shall inform Owner promptly, and Owner may, among other things, stop the work and order remedial measures. This provision shall not eliminate or reduce the responsibilities or requirements placed upon contractor and/or subcontractors by the Contract Documents and shall not place any liability upon the Owner for action or omission in regard to this provision.
- 2.11 In accordance with the requirements of ARTICLE 8.5, Project Representative will determine amounts owing to Contractor and will recommend that Owner issue payment in the amount determined due.
- 2.12 Project Representative, with the concurrence of Owner, will determine the dates of Substantial Completion and Final Completion. The Architect will receive and forward to Owner for Owner's review, written warranties and related documents required by the contract and assembled by Contractor.

2.13 Project Representative's duties, responsibilities, and limitations of authority will not be modified without written consent of Owner and Project Representative.

ARTICLE 3 OWNER GENERAL RIGHTS AND DUTIES

- 3.1 At Owner's option, Owner may undertake any or all tasks of Project Representative described in ARTICLE 2.
- 3.2 Owner's directions to Contractor will be made in writing either directly or through Project Representative in accordance with ARTICLE 2. No verbal representation shall be binding upon any party unless confirmed in writing.
- 3.3 Owner shall have the right to perform work related to the project under separate contract(s) in accordance with the provisions of ARTICLE 6.
- 3.4 Owner shall have the right to issue change orders from time to time which may alter the scope of work required by the Contract Documents. All change orders will be subject to provisions of ARTICLE 9.
- 3.5 Owner will have the authority to reject work which does not conform to the requirements of the Contract Documents and to require such remedial work at no charge or expense to Owner as is necessary to correct the defective work. Where defective work is being performed by Contractor and Contractor fails to correct the defective work within a reasonable period of time as set out in ARTICLE 10, or repeatedly fails to carry out the work in accordance with the Contract Documents, Owner shall have the authority to order an immediate halt to all defective work. Any losses suffered by Contractor as a result of the halt shall be borne by Contractor without recourse to Owner. Issuance of a stop-work order shall not be construed as constituting a breach of the agreement nor authorize Contractor to refuse to perform other portions of the work which Owner has not halted.
- 3.6 Owner shall have the right to terminate the contract or suspend performance of the contract as set out in these general conditions or other Contract Documents.
- 3.7 Owner shall promptly pay Contractor all sums properly due as provided by ARTICLE 8. If Owner fails to issue payment for a period of forty-five (45) days after the certificate of payment has been approved by Project Representative, without a written statement indicating why payment is being withheld, then Contractor may terminate the contract upon seven (7) days written notice to Owner and may recover from Owner payment for all work executed and for any proven losses sustained upon any materials, equipment and tools, including a reasonable profit and overhead.
- 3.8 Owner and Contractor warrant that neither party will maintain an action against the other for punitive or exemplary damages.

ARTICLE 4 CONTRACTOR'S GENERAL RIGHTS AND DUTIES

4.1 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

4.1.1 Contractor represents by execution of the Agreement that Contractor has carefully examined the Contract Documents and the site upon which the work is to be performed and has developed familiarity with the nature, extent, site access, and risks involved in the work and with all local conditions and applicable statutes, ordinances and regulations that may affect the performance of the work. Contractor assumes full responsibility for having correlated Contractor's study of the Contract Documents and observation of the site. Contractor represents that Contractor has studied all available surveys and investigation reports of subsoil and latent physical conditions of the site and has made such additional surveys and investigations as Contractor deemed necessary for the performance of the work at the contract price, within the time specified and in accordance with the requirements of the Contract Documents.

- 4.1.2 Contractor warrants that the Contract Sum is reasonable compensation for the Work and the time for completion of the Work, as set out in the Contract Documents, is adequate for the performance of the Work as represented by the contract, bidding documents, and the general conditions known or reasonable anticipated for the site.
- 4.1.3 Contractor shall not begin work until given a Notice to Proceed, which will be issued as promptly as possible after the Agreement has been executed by all parties. If Owner is required to delay issuance of a Notice to Proceed for more than five (5) working days because of fault of Contractor or other reasons which Owner deems sufficient, then Contractor shall be notified in writing of the delay and when issuance of the Notice to Proceed is anticipated.
- 4.1.4 Before commencing any part of the work, and prior to undertaking each subsequent phase of the work, Contractor shall carefully study the plans and specifications and check and verify all previous work and pertinent dimensions, figures and amounts shown in them and shall make all applicable field measurements. Contractor shall at once report in writing to Owner any apparent conflict, ambiguity, discrepancy, error or other omissions which Contractor may discover. Contractor shall be liable to Owner for failure to notify Owner of any conflict, ambiguity, discrepancy, error or other omissions which Contractor discovered, but failed to report to Owner and shall be responsible for providing a remedy.
- 4.1.5 Contractor shall lay out the work from established base lines and bench marks indicated on the drawings and shall be responsible for all measurements in connection therewith. Contractor will be held responsible for the execution of the work to such lines and grades. It shall be the responsibility of Contractor to maintain, preserve, or replace all stakes and other marks.
- 4.1.6 Drawings showing location of equipment, piping, etc., are diagrammatic and job conditions will not always permit installation in the location shown. If a situation occurs which may require relocation of an item or system which substantially differs from the location called for in the Contract Documents, it shall be brought to Owner's attention immediately and the relocation determined with the concurrence of Architect or Engineer. If Contractor relocates such items without approval, Contractor will be responsible for any cost or expense for removal or further relocation necessitated by installation without approval.

4.2 SUBMITTALS

- 4.2.1 Within 20 days after the effective date of the notice to proceed and prior to commencement of work, Contractor shall submit to Owner the construction progress schedule and schedule of values required in Articles 4.2.2, 4.2.3 and 4.2.4. The schedule of values and progress schedule must be acceptable to owner and provide reasonable divisions of contract work with corresponding payment. No payment will be made under this contract prior to completion of this requirement.
- 4.2.2 In accordance with the Division 1 requirements governing submittals as provided in the contract specifications, Contractor shall prepare and submit to Owner a detailed progress schedule for the work which reveals and identifies the critical path of progress, which is consistent with the work and time required by the contract, and which shall provide for the most expeditious and practicable execution of the work. Float time between work items is part of the project and not property of the Contractor. Float time is defined as the amount of time that spans from completion of one previously scheduled activity and extends to the point at which the next scheduled activity is set to begin.
- 4.2.3 Contractor shall also provide Owner with a proposed schedule of values upon submittal of a detailed progress schedule for the work. The schedule of values shall be allocated to various portions of the work and be prepared in such a form and supported by such data to substantiate its accuracy as reasonably required by Owner. Each item of work shall include all applicable profit and overhead. This schedule of values, unless objected to by owner shall be the basis for progress payments made to Contractor and shall include a specific lump sum amount for "Final Payment." This line item shall be in conformance with guidelines specified in ARTICLE 8. Contractor, at the request of Owner, shall amend the progress schedule and the schedule of values as the work progresses.
- 4.2.4 The schedule of values must show a complete breakdown of all phases of the work required by the Contract Documents. Payment will be in accordance with Article 8. Pay requests, schedules of value and progress schedules must correspond.
- 4.2.5 Contractor shall submit for Architect's and Owner's approval all product data required by the Contract Documents in conformance with the dates specified in the detailed progress schedule. Such data include illustrations, standards, schedules, performance charts, instructions, brochures, diagrams, or other information necessary to assist Architect in determining whether a proposed product meets the intent of the Contract Documents.
- 4.2.6 Contractor shall also submit physical samples of materials, equipment or workmanship where required by the Contract Documents. After approval by Owner and Architect, the sample shall be established as the minimum standard of work, material, equipment or other quality which will be acceptable for work of which the sample is representative.
- 4.2.7 Submittal of shop drawings by Contractor constitutes a representation by Contractor that the submittal and work, or products required or to be used in accordance with that submittal, will meet or exceed the criteria and conditions of the Contract Documents and that performance of the work identified in those submittals will meet the progress schedule.
- 4.2.8 Before initiating any work for which shop drawings are required, Contractor shall obtain Architect's approval of the shop drawings, which include drawings, diagrams, schedules and other data specially prepared by Contractor, a subcontractor, a manufacturer, a supplier or distributor to illustrate in detail that portion of the work. Contractor shall review, approve, and submit all shop drawings, whether prepared by himself/herself or subcontractor or supplier. It shall be the duty of Contractor to provide a whole or complete system and to coordinate all work depicted by a particular shop drawing with the work required by other shop drawings for that portion of the work or for related or adjacent work.
- 4.2.9 Unless otherwise instructed, Contractor shall provide all submittals and correspondence to the Project Representative. At the direction of the Project Representative, Architect will review Contractor's submittals only for conformance with the design concept of the work and the information given in the Contract Documents. Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. Architect will return reviewed submittals to Contractor with written comments and forward one set to Project Representative with reasonable promptness so as to cause no delay. A minimum of five (5) sets of submittals shall be required.
- 4.2.10 Should Architect reject any proposed shop drawings, product data or sample, Contractor shall resubmit revised drawings, samples or product data and draw Architect's attention to any deviation or revisions other than those requested by Architect.

4.2.11 All of Contractor's submittals shall be made in conformance with the dates specified in the detailed progress schedule with reasonable promptness and in such sequence as to cause no delay in the work of Owner or any separate contractor.

4.3 SAFETY AND CONTROL OF SITE

- 4.3.1 Contractor is deemed to be in physical control of the work site. Contractor shall confine Contractor's operations at the site to those areas described in the Contract Documents or permitted by applicable statutes, ordinances or permits.
- 4.3.2 Contractor shall not unreasonably encumber the site with materials, equipment or ancillary construction. Contractor shall be responsible for eliminating or minimizing to the extent reasonably possible, public hazards and inconveniences which might result from this work.
- 4.3.3 Contractor shall at all times keep the premises free from accumulation of excess snow, waste materials or rubbish and shall keep adjacent public road clear of mud and dust caused by Contractor's activities. At the completion of the work, Contractor shall remove all waste materials and rubbish from the project as well as Contractor's tools, equipment and surplus materials. The removal and disposal of waste materials, rubbish, or other material, shall be accomplished in accordance with all local, state and federal requirements.
- 4.3.4 Contractor shall be responsible for initiating, maintaining and supervising all necessary safety precautions in connection with this work and shall be responsible for ascertaining and adhering to all applicable federal, state, and local standards, laws, ordinances, regulations, requirements and any lawful order of any public authority bearing on the safety of persons or property or their protection from damage, injury, or loss.
- 4.3.5 Contractor's duty to maintain a safe and secure project site shall include all precautions necessary to assure the safety and protection against injury and damage, of all employees engaged in the work and any other person who may be affected by the work including Owner's agents and employees; Contractor's agents and employees; and members of the general public. Contractor shall assure the safety and protection of all work, materials and equipment which may be upon the site; utilities and other property of Owner including portions of structures and utilities not designated for removal or relocation, trees, shrubs, lawns, walks, pavements and roadways. Contractor duties include but are not limited to protection of project site from vandalism. Such precautions shall further include but not be limited to protection from dangers from hazardous materials.
- 4.3.6 Contractor shall take all necessary measures to prevent members of the general public from entering upon the site without the permission of Owner or Contractor.
- 4.3.7 Contractor shall comply with all OSHA requirements, give all safety notices, erect and maintain all reasonable safeguard notices and barriers, including danger signs and fences which may be required to protect the site and limit access to it.
- 4.3.8 In the event of an emergency, the Contractor will take all means necessary to minimize all damage to or exposure from effects of a catastrophic event. In such case, the Contractor may consult with Owner or seek Owner's assistance. The responsibility for protection of the site, work, and all material remains with the Contractor.
- 4.3.9 Contractor shall designate a person in Contractor's employ at the site to be primarily responsible for the prevention of accidents, identification of all applicable safety standards, statutes and regulations, including but not limited to those addressing hazardous material, and full compliance therewith. This person shall be Contractor's Superintendent unless otherwise designated by Contractor in writing to Owner.

- 4.3.10 Should Project Representative or other representative of Owner ascertain that a safety danger exists, Project Representative or Owner may order an immediate cessation of all dangerous activity and a correction of any safety hazard. Written notice of the order to stop work or to correct the safety hazard shall be made to Contractor as soon as practicable. Contractor shall have no recourse against Owner for any alleged losses or delays arising from this section unless the order to stop work or correct safety deficiency is wholly without basis.
- 4.3.11 Should Contractor elect to utilize explosives or other hazardous materials or equipment, or should Contractor be required to do so for the execution of the work, Contractor shall first give jurisdictional authorities and Owner notice of the intention to utilize hazardous materials, explosives or equipment at a particular time and date. Contractor shall use the utmost care in utilizing such materials and shall use only properly qualified and licensed personnel.
- 4.3.12 Contractor shall correct any damage to the property of Owner or other parties which arises out of the activities or omissions of Contractor, Contractor's agents, subcontractors, employees, personnel or suppliers. Contractor shall commence remedial activities within seven (7) days from the date of the damage. If Contractor fails to do so, Owner or the affected party may utilize his own forces to correct or replace the damaged property and Contractor shall promptly reimburse Owner or the affected party for all losses and costs thereupon. In the event Contractor fails to reimburse Owner as set forth herein, Owner may set off the amount due Owner from any amount due Contractor.

4.4 SUPERVISION AND QUALITY OF THE WORK

- 4.4.1 Contractor shall supervise and direct the work using the best skill and attention. Contractor is responsible for, and agrees to comply with all applicable local, state and federal ordinances, laws, regulations and statutes. Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for the schedule and coordination of all portions of the work to be performed under the contract. Contractor shall also be required to coordinate the work with that of any other contractor working on the project so as to minimize delay, inconvenience, and expense to both. Where identified in writing by Owner at any time, Contractor shall be required to coordinate the work with any partial use of the site that Owner deems necessary.
- 4.4.2 All materials and equipment shall be applied, installed, connected, erected, used, cleaned, prepared or conditioned in accordance with the instructions of the applicable manufacturer, fabricator or processor except as otherwise provided in the plans and specifications.
- 4.4.3 Contractor shall keep on the job site at all times during work progress, a competent resident superintendent capable of reading and thoroughly understanding the plans and specifications. The superintendent will be Contractor's representative at the site and all communications given to the superintendent shall be as binding as if given to Contractor directly. In the event Contractor decides to replace the superintendent, Contractor shall submit to Owner a written notice including the proposed new superintendent's qualifications. The superintendent shall not be replaced without this written notice and a statement of non-objection by the Owner.
- 4.4.4 Contractor shall provide sufficient, competent, and suitable qualified personnel to survey and lay out the work and to perform all construction required by the Contract Documents. Contractor is responsible for maintaining good discipline and order at the job site at all times and shall not employ any unfit person or anyone not skilled in the task assigned to that person.

- 4.4.5 Contractor shall be fully responsible to Owner for the acts and omissions of Contractor's employees and agents, Contractor's subcontractors and their employees and agents, and any other persons performing any of the work for the benefit of Contractor.
- 4.4.6 Contractor shall not permit the possession or use of alcohol or controlled substances on the site, and shall remove from the site any person who possesses, uses, or is under the influence of alcohol or controlled substances. Contractor shall not permit the smoking of tobacco, marijuana or e-cigarettes in any enclosed space. Contractor shall require all Contractor's agents, subcontractors, employees or suppliers who perform work on site to sign a statement that they have been informed and will abide by the above policy. A copy of all such statements shall be kept at the job site throughout the duration of Contractor's work.
- 4.4.7 Contractor warrants to Owner that all work will be free from faults and defects and meeting or exceeding the requirements of the Contract Documents and all local, state, and federal legal requirements. All work not so conforming to these standards will be considered defective, and Owner may require its correction.

4.5 DIVISION OF THE WORK

4.5.1 The division of the work into various specialties and divisions in the contract specifications and drawings shall not bind Contractor in apportioning the work among various subcontractors, specialty contractors or workers, and Contractor's own employees.

4.6 TITLE 36 AND OTHER STATUTORY REQUIREMENTS

- 4.6.1 Contractor shall give and post all notices and comply with all federal, state, and local laws, ordinances, regulations, requirements and any lawful order of any public authority bearing on the performance of the work, and shall notify Owner in writing if the drawings and specifications or the Contract Documents are at variance therewith. If Contractor knows or should know that Contractor is performing work contrary to such legal requirements without giving written notice to Owner in time for Owner to give a stop work order, the Contractor shall bear all costs to remedy that work and to bring it into conformance with the applicable requirements. In the event Contractor fails to reimburse Owner as set forth herein, Owner may set off the amount due Owner from any amount due Contractor. This requirement does not lessen or alter the requirement for indemnification stated in ARTICLE 4.13.
- 4.6.2 Contractor and subcontractors shall strictly comply with all requirements of Title 8, Chapter 30 of the Alaska Administrative Code and Title 36 of the Alaska Statutes as applicable to this contract.
- 4.6.3 Contractor or subcontractors of the contractor shall pay all employees unconditionally as required by AS 36.05.040 and any other applicable laws or regulations. Wages may not be less than those stated in the advertised specifications, regardless of the contractual relationship between the Contractor or subcontractors and laborers, mechanics, or field surveyors. The wages are determined for the region in which the work is done and the rates are issued by the Alaska State Department of Labor (see attached Title 36 wage schedule). The scale of wages to be paid shall be posted by Contractor in a prominent and easily accessible place at the site of the work. If it is found that a laborer, mechanic or field surveyor employed by the Contractor or subcontractor has been or is being paid a rate of wages less than the rate of wages required by this contract, Owner may, on written notice to Contractor hold Contractor in immediate default and terminate Contractor's right to proceed with the work or that part of the work for which there is a failure to pay the required wages, and Owner may prosecute the remaining work to completion by contract or otherwise, holding Contractor and Contractor's sureties liable for any costs in excess of the contract price. In the event Owner permits Contractor to pursue further work under the contract, Owner shall withhold so much of the accrued payments as is necessary to pay to laborers, mechanics, or field surveyors employed by the Contractor or subcontractors the difference between the rates of wages required by the contract to

be paid laborers, mechanics, or field surveyors on the work and the rates of wages in fact received by laborers, mechanics, or field surveyors.

4.6.4 A copy of certified payrolls shall be provided to the Project Representative with each Progress Payment Request.

4.7 **PROJECT RECORDS**

- 4.7.1 Contractor shall maintain at the project site copies of plans and technical specifications, approved shop drawings and manufacturers' information sheets, and other contractor documents which are necessary for the expeditious and correct execution of the work.
- 4.7.2 Contractor shall maintain at the project site a complete daily job report showing job conditions, work activities started, in progress, interrupted and completed; work force, including identification and number of Contractor's employees and subcontractors by craft; receipt and disposition of materials and equipment; tests performed, visiting personnel and any accidents on a particular day. Owner shall have access to the daily report at all times. A copy of each daily report shall be provided to Project Representative at the end of each week.
- 4.7.3 Contractor shall keep one record copy of all specifications, drawings, addenda, modifications, and shop drawings at the job site in good order and annotated to show all changes made during the construction process. These shall be available to Owner during construction and turned over to Owner prior to final completion of the work.

4.8 ALLOWANCES

4.8.1 Contractor shall include in the contract sum all allowances stated in the specifications or plans, and all items covered by these allowances shall be supplied in such amounts, or by such a person, as Owner may direct. The allowance shall include the cost to Contractor, less applicable trade discounts, of materials and equipment required by the allowance; delivery at the site, applicable taxes; Contractor's cost for unloading and handling on the site, for labor, installation, overhead, profit and other expenses incurred by Contractor. Whenever the cost of the allowed item exceeds or is less than the allowance, the contract sum shall be adjusted equitably by change order.

4.9 NONDISCRIMINATION

- 4.9.1 Contractor must comply with all federal and state laws, rules, regulations and orders, and all local ordinances, regulations and rules concerning wages, taxes, social security, workers' compensation, nondiscrimination, licenses, registration requirements, and similar provisions governing employment of individuals.
- 4.9.2 Contractor will not discriminate against any employee or applicant for employment or refuse employment to a person, or bar a person from employment, or discriminate against a person in compensation or in a term, condition, or privilege of employment because of the person's race, religion, color, or national origin, or because of the person's age, physical or mental disability, sex, marital status, changes in marital status, pregnancy, or parenthood when the reasonable demands of the position do not require distinction on the basis of age, physical or mental disability, sex, marital status, changes in marital status, pregnancy, or political affiliation. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause. Contractor further agrees to insert this provision in all subcontracts hereunder and to require the subcontractors to insert this provision in their subcontracts.

Notwithstanding the prohibition against employment discrimination on the basis of marital status or parenthood stated above, an employer may, without violating this provision, provide greater health and retirement benefits to employees who have a spouse or dependent children than are provided to other employees.

- 4.9.3 Contractor shall state, in all solicitations or advertisements for employees to work on contract jobs, that all qualified applicants will receive consideration for employment in accordance with the above referenced nondiscrimination clause.
- 4.9.4 Contractor shall comply with the reporting requirements which the State of Alaska may establish by regulation.
- 4.9.5 Contractor shall include the provisions of these paragraphs in this section in every subcontract or purchase order under this contract so as to be binding upon every such subcontractor or vendor of Contractor under this contract.

4.10 TAXES

- 4.10.1 Contractor shall pay all sales, consumer, use and other taxes for the work or portions thereof provided by Contractor which are legally enacted at the time bids are received, whether or not yet effective.
- 4.10.2 Contractor shall comply with Owner's requirements for payment of taxes. This contract is specifically subject to the provisions of Section 5.28.140 of the Kenai Peninsula Borough Code of Ordinances, as it now stands or as it may be amended, including but not limited to termination of the contract for non-compliance. If the violation arises from failure to file or remit sales taxes, no payment will be made to Contractor until all filings have been made and all amounts due are paid.

4.11 PERMITS, FEES, AND NOTICES

4.11.1 Unless otherwise provided in the Contract Documents, Owner shall secure and pay for the building permit. Contractor shall secure and pay for all other legally required permits and government fees, licenses and inspections necessary for the proper execution and completion of the work. These are customarily secured after execution of the contract. These costs are part of the contract price. This provision does not lessen the requirements set out in ARTICLE 1.4.

4.12 ROYALTIES AND PATENTS

4.12.1 Contractor shall pay for all royalties and license fees. Contractor shall defend all suits or claims for infringement of any patent rights and shall save Owner harmless from loss on account thereof.

4.13 INDEMNIFICATION

4.13.1 The Contractor shall indemnify, hold harmless, and defend the borough at its own expense from and against any and all claims, losses, damages or expenses, including reasonable attorney's fees, of, or liability for, any wrongful or negligent acts, errors, or omissions of the Contractor, its officers, agents or employees, or any subcontractor under this contract. The Contractor shall not be required to defend or indemnify the borough for any claims of, or liability for, any wrongful or negligent act, error, or omission solely due to the independent negligence of the borough. If there is a claim of, or liability for, the joint negligence of the Contractor and the independent negligence of the borough, the indemnification and hold harmless obligation shall be apportioned on a comparative fault basis. Apportionment shall be determined upon final determination of percentage of fault. If any such determination is by settlement, the percentage of fault attributed to each party for purposes of this indemnification provision shall only be binding upon the parties included in the settlement agreement. "Contractor" and "borough" as used in this article include the employees, agents, officers, directors, and other contractors who are directly responsible, respectively, to each. The term "independent negligence of the borough" is negligence other than in the borough's selection, administration, monitoring, or controlling of the Contractor and in approving or accepting the Contractor's work.

ARTICLE 5 SUBCONTRACTORS AND SUPPLIERS

5.1 DEFINITIONS AND RESPONSIBILITIES

- 5.1.1 A subcontractor is a person or entity having a direct contractual relationship with Contractor, or with one of Contractor's subcontractors, to perform any of the work at the site. A supplier is any manufacturer or person or firm providing materials, equipment or assemblies to Contractor or to one of the subcontractors for inclusion in this project.
- 5.1.2 All contracts between Contractor, subcontractors and suppliers (whether or not in privity with Contractor) shall be in accordance with the terms of this contract and shall incorporate the General Conditions of this contract. Contractor shall include in such contracts, and require its inclusion in any subcontracts, a provision holding any subcontractor or supplier (whether or not in privity with Contractor) directly accountable to Owner for work which fails to meet the requirements of the Contract Documents, or which prevents Contractor or any subcontractor from performing work. This direct accountability to the Owner shall be in addition to Contractor's liability for any such failure.
- 5.1.3 The provisions in this ARTICLE shall not be construed as creating a right of recourse, or any direct contractual relationship, between Owner or Owner's agents and any subcontractor, supplier, or manufacturer (whether or not in privity with Contractor).
- 5.1.4 Contractor shall make all necessary copies of these Contract Documents available to Owner and to each subcontractor and shall require each subcontractor to make copies of these Contract Documents available to each of Contractor's subcontractors, if any.
- 5.1.5 Contractor shall be fully responsible for enforcing discipline among subcontractors, their employees and their subcontractors, and for insuring that each subcontractor performs the work in accordance with the Contract Documents and all safety regulations.
- 5.1.6 Contractor shall have the discretion to require subcontractor(s) to provide payment or performance bonds for work of the subcontractor(s).

5.2 AWARDS TO SUBCONTRACTORS AND SUPPLIERS

- 5.2.1 At Owner's request Contractor shall submit to Owner a list of all principal subcontractors and material suppliers and shall not contract with any proposed person or organization to whom Owner voices a reasonable objection. This provision applies to substitution of subcontractors or suppliers subsequent to Owner's initial objection to a proposed person or entity. Such list shall be submitted in accordance with Division 1 requirements as provided in the contract specifications.
- 5.2.2 Rejection of a proposed subcontractor or material supplier shall not entitle Contractor to any increase in the contract sum or time.

5.2.3 At Owner's request Contractor shall submit to Owner a copy of any subcontract and any purchase orders for materials and equipment prior to purchase of such items.

5.3 CONTRACTOR PAYMENTS TO SUBCONTRACTORS AND SUPPLIERS

- 5.3.1 Recognizing the importance of maintaining the integrity of a public contract, Contractor warrants that Contractor will pay all subcontractors and material suppliers at least monthly upon approval of the subcontractors' and materials suppliers' billing, for all apparently acceptable work performed on the site during the preceding month and for all apparently acceptable material incorporated into the project or delivered and properly stored at the site during any month for which Contractor has received payment from Owner.
- 5.3.2 In furtherance of Contractor's warranty under this ARTICLE and ARTICLE 8, Owner, may require Contractor to declare Contractor's status of accounts with any or all the subcontractors and suppliers. A proof of payment to subcontractors and suppliers shall be made in a form acceptable to Owner. If Contractor breaches this warranty and fails to pay each subcontractor and materials supplier within 45 days after a monthly billing has been presented, then Owner reserves the right to withhold sufficient sums from Progress Payments due to Contractor and to issue payment to the subcontractors or material suppliers directly. This ARTICLE shall not be construed as creating a right in the subcontractor agrees to release and indemnify Owner for any claims arising therefrom, either by Contractor directly or by any subcontractor or material supplier. Likewise, this ARTICLE shall not be construed as creating a right in Contractor directly or any other subrogated party to have direct recourse against Owner for failure to withhold sums pursuant to this section.

ARTICLE 6 SEPARATE CONTRACTS

- 6.1 Owner has the right to award separate contracts for work on the project that is not included in this contract.
- 6.2 When separate contracts are awarded for different portions of the Project or other work on the site, the term Contractor in the Contract Documents in each case shall mean the Contractor who executes each separate contract.
- 6.3 Contractor shall afford other contractors and Owner's own forces reasonable opportunity for the introduction and storage of materials and equipment and for the execution of their work and shall properly connect and coordinate Contractor's work with theirs as required by the Contract Documents.
- 6.4 Any costs caused by defective or ill-timed work under separate contracts shall be borne by the party responsible thereof and shall be paid promptly.
- 6.5 If Contractor alleges that delay or additional costs were caused by the letting of separate contracts or by work performed by Owner's own forces, then Contractor may request an equitable adjustment by change order as provided below.
- 6.6 If any part of Contractor's work depends upon work performed by Owner or any separate contractor, prior to proceeding with the work, Contractor is required to report to Owner any apparent discrepancies, defects or delays in the other work which impede proper execution of the work required by this contract. If Contractor fails to report such unsuitable work by another contractor to Owner, then Contractor shall be deemed to have accepted the unsuitable work and any liability for all deficiencies, damages and costs which arise as a result of the defective work or of Contractor's use or covering of the unsuitable work.

- 6.7 Should Contractor or any subcontractor delay or cause damage to the work or property of any other contractor or person, Contractor shall repair the damage or settle the claim and shall further, to the extent allowed by law, indemnify, defend, and hold Owner harmless from any and all claims, costs, expenses, injury, damages, or loss of any kind, including attorneys' fees, court costs, or arbitration costs, which arise out of such delay or damage.
- 6.8 Should a dispute arise between Contractor and separate contractors as to the responsibility for completing, finishing or cleaning up particular work or a portion of the work, Owner may complete, finish or clean up the disputed portion and apportion the cost among Contractors responsible as Owner shall determine to be equitable.

ARTICLE 7 BONDS AND INSURANCE

7.1 PERFORMANCE AND PAYMENT BONDS

- 7.1.1 For contracts with a contract sum of one hundred thousand dollars (\$100,000) or greater, or as otherwise specified in the request for bid, Contractor shall provide as part of the basic contract sum, a performance bond and a payment bond, each in the amount of 100% of the contract amount, prior to Owner's execution of the contract. Contractor shall have no recourse of any kind against Owner, if Owner declines to award a contract due to Contractor's failure to provide the required bonds. These bonds, in whatever amount required by the specific contract, shall be administered and deemed governed by the provisions of Alaska Statutes Title 36, Chapter 25 and shall comply with all requirements for payment and submission of claims as provided by that chapter.
- 7.1.2 All bonds shall name Owner as the beneficial party and shall protect Owner for a period of at least one year subsequent to the date of final payment upon this contract. All bonds shall be executed upon a form acceptable to Owner and by a surety company licensed to do business within the State of Alaska and acceptable to Owner. The form of the bond shall provide that Owner shall have at least thirty (30) days prior notice of any lapse in bond coverage. The bond payment shall be applicable to all subcontractors or material suppliers (whether or not in privity with Contractor) who might attempt to assert a claim against Owner.
- 7.1.3 Owner may inform the surety as to the general progress and status of the work. A copy of all communications with the surety company shall be provided promptly to Contractor upon request.
- 7.1.4 In the event Contractor refuses, or is unable to make payments to laborers, subcontractors or material suppliers, or to complete the work, or to correct defective work, within the times provided by this contract, Owner may elect to call upon Contractor's surety to rectify Contractor's default. Contractor shall first be given seven (7) calendar days written notice (effective when mailed) of Owner's intentions to call upon the surety company and Owner shall specify to Contractor the basis for the proposed course of action. If Contractor fails to correct the default within the time provided, Owner shall promptly call upon the surety.
- 7.1.5 Prior to final payment, Contractor shall provide written consent of each affected surety releasing Owner from any further claims arising from payment to Contractor and obligating the surety company to rectify any default, nonpayment, defective work, error, omission or deficiency of Contractor.
- 7.1.6 Contractor and Owner expressly agree that Owner shall be entitled to retain from payments to Contractor amounts in excess of normal retainage if these additional amounts may be necessary to indemnify Contractor's surety for any payment or corrective work which the surety might be required to undertake. This additional retainage will be made only upon written directive by Contractor's surety specifying the

reason for retaining extra amounts, the amounts to be retained and agreement of the surety to reimburse Owner for any interest which may be due Contractor under the provisions of the Alaska Statutes.

7.2 CONTRACTOR'S INSURANCE

- 7.2.1 The services to be rendered under this contract are those of an independent Contractor.
- 7.2.2 Contractor and all subcontractors, if any, shall be responsible for the purchase and maintenance of all insurance required by law and at a minimum purchase the insurance coverage as specified in ARTICLE 7.2.5 and 7.2.6 below, and any other insurance coverage as may be specified in ARTICLE 7.2.11 SUPPLEMENTARY GENERAL CONDITIONS OF INSURANCE, if attached and forming a part of this contract.
- 7.2.3 This insurance coverage required by ARTICLE 7.2.5 and 7.2.6, and ARTICLE 7.2.11 if attached, shall be in acceptable form, and for the amounts specified by the Kenai Peninsula Borough and School District, or as required by law, whichever is greater.
- 7.2.4 The insurance policies shall remain in force for the life of the contract and shall be a part of the contract price.
- 7.2.5 Commercial general liability with minimum coverage of \$1,000,000 and automobile liability insurance with minimum coverage of \$1,000,000 combined single limit bodily injury and property damage per occurrence. This insurance shall be primary and exclusive of any other insurance carried by the Kenai Peninsula Borough and School District. The commercial general liability insurance shall be without limitation on the time within which the resulting loss, damage, or injury is actually sustained.
- 7.2.6 Per Alaska State Statutes, Worker's Compensation and Employers Liability Insurance shall be provided for all employees who are performing work under this contract.
- 7.2.7 Certificate(s) of Insurance shall be provided by Contractor and all subcontractors, or their Insurance Companies and/or their Agents, naming the Kenai Peninsula Borough and School District or other appropriate Borough entity as an additional insured for the work specified in this contract. The certificates of insurance must reference the specific contract by name and project number. Certificates of Insurance, acceptable in form and content, will be delivered to Owner at the address designated for legal service in the agreement, at or prior to presentation of the contract for execution by owner.
- 7.2.8 There shall be no cancellation or material change of the insurance coverage, or intent not to renew the insurance coverages as specified in this contract, without thirty (30) days prior written notice to the Kenai Peninsula Borough. Notice of cancellation, material change in coverage, or intent not to renew will be delivered to the address designated for legal notice in the agreement.
- 7.2.9 Upon renewal or change in policies during the contract, Certificates of Insurance shall be delivered to the address designated for legal notice in the agreement.
- 7.2.10 Owner shall have the option to purchase and maintain such insurance as will protect Owner against property losses or liability claims, which may arise from operations under the contract. Insurance providing coverage against fire and extended coverage perils, may, at Owner option, provide coverage to the full insurable value of the project and insure the interests of Contractor and all subcontractors as their interests may appear. Any recovery for loss insured pursuant to this General Condition is to be adjusted to Owner and made payable to Owner as trustee for the insured, as their interests may appear. This section does not modify the contractor or subcontractors' responsibility to provide insurance as required in ARTICLE 7.

7.2.11 Additional insurance requirements may be added in supplementals as Supplementary General Conditions of Insurance.

ARTICLE 8 MEASUREMENT, PAYMENT AND COMPLETION

8.1 SCOPE OF PAYMENT

8.1.1 Unless altered by change order, Contractor shall be paid only that sum set forth in the agreement between Owner and Contractor as Contractor's compensation for performance of all work required by the Contract Documents.

8.2 LUMP SUM PAY ITEMS

- 8.2.1 Each bid item is characterized as either a lump sum item or a unit price item in the bid documents. Where the item is bid at a lump sum price, no additional compensation shall be paid to Contractor for additional work required because Contractor failed to include items or quantities in Contractor's estimate or a subcontractor's estimate, or failed to utilize proper construction means, methods, procedures or sequence or by virtue of any decision of Contractor.
- 8.2.2 Contractor is required to provide and pay for all requirements necessary for the proper execution and completion of the contract unless specifically excluded by the Contract Documents. The costs are part of the contract price. The requirements include but are not limited to the requirements stated in ARTICLE 1.4.
- 8.2.3 All materials and equipment incorporated in the work shall be new except as otherwise provided in the Contract Documents. All materials and equipment shall meet or exceed the requirements of the plans and specifications and Contractor shall furnish, if requested, satisfactory evidence as to the source, kind and quality of any materials and equipment.

8.3 UNIT COST ITEMS

8.3.1 Quantities appearing in the bid schedule are approximate and are prepared for comparison of bids. Payment to Contractor will be for actual quantities of work performed and materials furnished in accordance with the Contract Documents. Scheduled quantities of work and materials may be increased, decreased or eliminated as provided herein.

8.4 APPLICATION FOR PAYMENT

- 8.4.1 Applications for payment shall be based on Contractor's submitted schedule of values, as approved by Owner per Section 4.2. Schedule of values shall be prepared in such form and supported by such data as may be required by Owner to substantiate its accuracy prior to Contractor's first application for payment.
- 8.4.2 The schedule of values shall include quantities of work, unit prices and other items comprising the contract price. It shall subdivide the work into each component part in sufficient detail to serve as the basis for progress payments during construction.
- 8.4.3 With each subsequent application for progress payment, Contractor shall provide a schedule of values to Owner showing all work which has been performed to date together with the value thereof, and the percentage of work completed.

8.5 **PROGRESS PAYMENTS**

- 8.5.1 Progress Payments shall be made monthly, based upon the amount of apparently acceptable work performed at the site and apparently acceptable materials purchased for the project and properly stored at the site during the previous month. Disbursement of progress payments will not effect a transfer of the risk of loss from the Contractor to the Owner for invoiced equipment or material. The risk of loss of the work and all material and equipment not yet incorporated in the work is the liability of the Contractor until substantial or final completion, whichever is earlier.
- 8.5.2 The value of work performed and materials stored shall be set forth in Contractor's revised schedule of values. If requested by Owner, Contractor shall promptly provide Owner any additional information necessary to ascertain the value of the work performed or the cost of materials stored at the site during the previous month. Each updated Schedule of Values shall be in the form of a notarized affidavit. Proof of certified payroll shall be provided per ARTICLE 4.
- 8.5.3 By application for payment, Contractor warrants and guarantees to Owner that title to all work, materials, and equipment for which payment is requested will pass to Owner either by incorporation in the construction and after substantial completion or upon receipt of payment, whichever occurs later, that such title will be clear of all liens, claims, security interests, and other encumbrances, except for liens to be released later prior to final payment and specifically identified on the application for payment, and that all such work, materials, and equipment are of acceptable quality.
- 8.5.4 Each application for payment shall be made no more frequently than once per month unless directed otherwise for work performed during the preceding month. Progress Payment requests shall be submitted to Project Representative for analysis and recommendation to Owner.
- 8.5.5 Project Representative will review Contractor's application for payment within seven (7) working days after receipt and if Project Representative ascertains that the amounts set forth therein are properly due and owing to Contractor, then Project Representative shall issue a Certificate of Payment to Owner. If Project Representative determines that only a portion of the sum requested is then properly due and owing to Contractor, then Project Representative may issue a Certificate of Payment in a lesser amount or may reject the application altogether. Project Representative will notify in writing both Contractor and Owner of the reasons for reduction or rejection of any application for Progress Payment.
- 8.5.6 Project Representative's issuance of a Certificate of Payment constitutes a representation that the work has progressed to the point indicated and that to the best of Project Representative's professional knowledge and information, Contractor is entitled to payment in the amounts certified.

8.6 RETAINAGE

- 8.6.1 After receipt from Project Representative of the Certificate for Payment, Owner shall make payment to Contractor within thirty (30) days. Owner shall have the option to retain up to 10% of the full amount of the Certificate for Payment plus lump sum amounts for material and equipment not properly stored, or subject to damage prior to use. Amounts retained by Owner may be held by Owner until project completion. If the project involves grant money or the borough has entered into a written contract with the state to provide state funds, payment will be made in accordance with AS 36.90.200-270.
- 8.6.2 Owner may withhold additional sums of money from progress payments in an amount sufficient to safeguard and protect Owner against any apparently meritorious claims against Contractor by any party other than Owner, and for any work which Owner ascertains to be defective or not meeting the requirements of the Contract Documents.

8.7 CONDITIONS OF PAYMENT

- 8.7.1 Project Representative may refuse to approve all or any part of any request for progress payment if, in Project Representative's opinion, it would be incorrect to make the representation to Owner set out in ARTICLE 8. Project Representative may also refuse to approve all or any part of any request for progress payment, if subsequently discovered evidence or the results of subsequent inspections or tests nullify any payment previously approved.
- 8.7.2 Owner may withhold payment to the extent necessary to protect Owner from loss resulting from:
 - A. Defective or damaged work;
 - B. Claims or liens which have been filed or may be reasonably expected;
 - C. Contract price reduction by modifications or change orders;
 - D. Owner cost to correct or complete defective work;
 - E. Unsatisfactory prosecution of the work by Contractor, including but not limited to failure to furnish adequate submittals or to clean up the work or site;
 - E. Reasonable evidence that the work cannot be completed for the unpaid balance of the contract sum;
 - F. Failure of Contractor to make payment properly due to subcontractors, employees, suppliers or utilities;
 - G. Reasonable evidence to believe the work cannot be completed within the Contract Time.
 - I. Damage to Owner's property not replaced or repaired in timely manner.

When the grounds for withholding payment are removed, payment shall be made for amounts withheld.

8.7.3 Neither the issuance of a Certificate of Payment, nor the making of any progress payment, nor the partial or entire use of the project by Owner shall constitute an acceptance of any work not in accordance with the Contract Documents nor shall it constitute a waiver of any right accruing to Owner or of any duty of Contractor.

8.8 SUBSTANTIAL COMPLETION

- 8.8.1 When Contractor considers the work substantially complete Contractor shall notify Project Representative in writing and request a Substantial Completion inspection. The notice shall include a comprehensive list of items to be completed, reasons they are not completed and a date of anticipated completion. The notice shall also include copies of all code compliance inspections, the Certificate of Occupancy, if applicable, and any other documents required by the contract.
- 8.8.2 Project Representative shall schedule the Substantial Completion inspection and notify Contractor. The inspection will be performed by Project Representative, Architect, Design Engineers, and Owner personnel in the presence of Contractor. Should this inspection find the work not substantially complete, Owner may

terminate the inspection and promptly notify Contractor in writing of the conditions for reinspection. Any deficiencies identified by this inspection will be listed and promptly furnished to Contractor for remedial action.

- 8.8.3 If Contractor has requested that Project Representative and Owner make an inspection to ascertain Substantial Completion, and if the work is not then substantially complete, Contractor shall be liable for all costs Owner, Architect, and Project Representative have incurred in making the inspection.
- 8.8.4 If it is determined on the basis of inspection that the work is substantially complete, Project Representative will issue a Certificate of Substantial Completion. Included in the certificate shall be a list of items which must be completed or corrected before final payment and the time within which such items shall be complete and corrected. Failure to include an item on this list does not alter the responsibility of Contractor to complete all work in accordance with contract requirements.
- 8.8.5 Certificate of Substantial Completion shall state the date of Substantial Completion and the respective responsibilities of Owner and Contractor for the maintenance, insurance and security of the work. Certificate of Substantial Completion shall specifically authorize Owner to take possession of the premises and utilize them for their intended purpose. Owner's beneficial occupancy of the premises shall make reasonable allowance for the performance of the work which Contractor must complete prior to final completion.
- 8.8.6 If Contractor fails to complete or correct work required by the Certificate of Substantial Completion within the time allowed, then the Certificate of Substantial Completion shall be voided and the Contract Time expended by Contractor shall be counted, and the acceptability of the work shall be inspected as if a Certificate of Substantial Completion had not been issued.
- 8.8.7 Upon Substantial Completion of the work and upon application by Contractor and certification by Project Representative, Owner shall make payment, reflecting adjustment in retainage, if any, for such work as provided in the Contract Documents.

8.9 FINAL COMPLETION AND WARRANTY PERIOD

- 8.9.1 Final Completion shall be represented by a lump sum dollar amount identified on the schedule of values. Final Payment represents a sum of money to perform all tasks necessary from Substantial Completion to Final Completion, including completion of final punch list, completion of as-built data, turnover of all warranty information, notarized acknowledgments of payments, and relinquishment of claims against Owner.
- 8.9.2 When Contractor considers the work ready for Final Completion, Contractor shall forward to Project Representative an application for final payment including (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work have been paid or otherwise satisfied, (2) consent of surety, if any, to payment, (3) irrevocable, notarized proof of payment and relinquishment of claim against Owner, issued by every subcontractor (whether or not in privity with Contractor), material supplier and other party who might assert a claim against Owner, and (4) all other documentation required by the Contract Documents. Project Representative and Owner shall promptly inspect the work to see that it is fully performed and complete, that all portions of the work are acceptable and that the contract is fully performed aside from completion of the Warranty Period. After Project Representative has made a determination that these requirements have been met, Project Representative shall prepare and recommend that Owner issue a Certificate of Final Completion and Final Payment.
- 8.9.3 Project Representative's approval of Final Payment constitutes an additional representation by Project Representative to Owner that to the best of Project Representative's knowledge and information, all

conditions which Contractor must fulfill prior to being entitled to Final Payment have in fact been fulfilled in accordance with the Contract Documents.

- 8.9.4 If any party refuses to relinquish its claim, or if Owner considers that any item or portion of the work: (1) is of doubtful acceptability under the Contract Documents; or (2) may diminish the value of the work; or (3) may prove to be ultimately unreliable; or (4) may prove to be less functional than required by the intent of the contract, then Owner, in lieu of refusing Final Payment to Contractor, may allow Contractor to furnish a bond in a form and in an amount satisfactory to indemnify Owner against losses occasioned thereby. If any additional costs to settle the claim or to correct work of doubtful quality accrue to Owner in excess of the indemnity available to Owner, Contractor shall refund to Owner all differences and costs which Owner might be compelled to pay, including all litigation costs and reasonable attorney fees.
- 8.9.5 Acceptance of final payment by Contractor constitutes an explicit waiver of all claims which Contractor might assert against Owner except those previously made in writing and identified by Contractor as unsettled at the time of the Application for Final Payment.
- 8.9.6 Final Payment to Contractor shall constitute a waiver of all claims which Owner might assert except those arising from: (1) unsettled claims; (2) faulty or defective work (3) failure of the work to comply with the requirements of the Contract Documents; (4) warranties required by this contract or that by their terms do not expire upon completion of the contract.
- 8.9.7 If, after Substantial Completion, Warranty Completion is delayed through no fault of Contractor, or by the issuance of change orders affecting Final Completion, Owner may, upon recommendation of the Project Representative, extend the Contract Time by a reasonable period and accept certified applications for further Progress Payments.
- 8.9.8 The contract sum identified on the schedule of values as "Final" shall be based on the contract award in an amount as follows:

<u>CONTRACT</u> <u>AWARD</u>			FINAL AMOUNT
\$45,000 -	\$100,000		9.00% of Contract Amount
\$100,000	-	\$249,999	5.00% of Contract Amount
\$250,000	-	\$499,999	3.00% of Contract Amount
\$500,000	-	\$1,999,999	2.00% of Contract Amount
\$2,000,000	-	\$4,999,999	1.50% of Contract Amount
\$5,000,000	-	\$9,999,999	1.25% of Contract Amount
\$10,000,000	-	\$19,999,999	1.00% of Contract Amount
\$20,000,000	-	up	0.75% of Contract Amount

8.9.9 Upon completion of all requirements identified in ARTICLE 8 as "Final" the funds representing Final Payment shall be released to Contractor along with the Certificate of Final Completion. Upon issuance of Certificate of Final Completion all contract sums shall be accounted for to Contractor and shall be paid to Contractor. However, any and all applicable bonds shall not be released until after the Warranty Period.

8.10 TIME AND LIQUIDATED DAMAGES

- 8.10.1 The time permitted for construction of the work will run from issuance of Notice to Proceed through the dates for Substantial Completion as specified in Agreement between Owner and Contractor, unless a specific completion date is specified.
- 8.10.2 The term "day" as used in this contract shall mean "calendar day" unless specifically stated otherwise.

- 8.10.3 All warranty periods and obligations accruing to Contractor through completion of the work shall be considered to begin on the date of Substantial Completion, unless otherwise agreed to separately in writing by Owner and Contractor.
- 8.10.4 Contractor shall begin the work as soon as possible after the date identified in Notice to Proceed and shall prosecute the work expeditiously and with adequate labor and materials.
- 8.10.5 Liquidated damages will, if agreed to by the parties and set out in the Agreement, be applied in the amount set out in the Agreement.
- 8.10.6 Claims for extension of time will be considered only if they affect "critical path" items specifically identified in the detailed progress schedule or in any applicable approved changes to the Contract. Claims for extension of the Contract Time must be made in writing to Owner, as provided in ARTICLE 9, not more than twenty (20) days after the reason for requested extension appears.

ARTICLE 9 CHANGES IN THE WORK, CONTRACT PRICE, AND TIME

9.1 CHANGE ORDERS

- 9.1.1 Without invalidating this contract, Owner may, at any time, order additions, deletions, or revisions in the work. All such changes must be authorized by written change order. Upon receipt of a change order, Contractor shall proceed with the work in accordance with applicable requirements of the Contract Documents. If any change order entails an increase or decrease in the contract price or an extension or curtailment of the Contract Time, adjustment will be made as provided herein.
- 9.1.2 Extra work will be paid for either at a fixed price specified in the change order (using unit prices or a lump sum amount) or on a time and materials basis.
- 9.1.3 Project Representative may authorize minor changes, alterations or deviations in the work in accordance with ARTICLE 2. These changes shall be authorized by written Field Order to be included in a subsequent Change Order.
- 9.1.4 Any additional work performed by Contractor without a fully executed Field Order or properly executed change order will not entitle Contractor to an increase in the contract amount or to an extension of the Contract Time, except in the case of emergency threatening life, safety or property.

9.2 ISSUANCE OF CHANGE ORDER

- 9.2.1 The contract sum constitutes the total compensation to Contractor for the work required by this contract. The contract price may be changed only by a properly executed change order. Any request for increase in the contract price shall be based upon written notice delivered to Project Representative within ten (10) days after the reason for the proposed increase appears. Change order proposals must be accompanied by all pertinent data and documentation, including a detailed estimate showing costs, quantities, unit prices and markups for overhead and profit.
- 9.2.2 Project Representative shall analyze Contractor's change order proposal and shall make a recommendation to Owner within a reasonable period of time. If Owner accepts the proposal, Project Representative shall prepare the change order for execution by Contractor and Owner.
- 9.2.3 The value of any work added or deleted by change order shall be determined by one of the following methods:

- A. Application of unit prices set forth in the bid: unit prices shall include all direct and indirect costs of the work, including labor, equipment (whether owned or rented), materials, home office expense, all overhead and profit. For unit price change orders involving credits to Owner, unit prices applied shall be 90% of the bid unit price.
- B. Application of mutually accepted unit prices for work not covered by bid unit prices: unit prices shall include all direct and indirect costs of the work, including labor, equipment (whether owned or rented), materials, home office expense, all overhead and profit.
- C. Mutual acceptance of a lump sum: Contractor's lump sum proposal must include an itemized breakdown of all costs of Contractor, subcontractors and suppliers. Breakdowns shall show quantities and prices of labor, materials, equipment and other direct costs. To direct costs shall be added the allowable combined overhead and profit as provided in ARTICLE 9.4.
- D. At Owner's option, Contractor may be directed to proceed with additional work on a "time and materials" basis which may also stipulate a maximum "not to exceed" amount. Contractor will be required to maintain and submit detailed records showing all quantities and prices of labor, materials, equipment and other direct costs. To direct costs shall be added the allowable combined overhead and profit as provided in ARTICLE 9.4.
- 9.2.4 When both additions and credits for related work or substitutions are involved in any one change, the allowance for overhead and profit shall be based on the net change. All related items within a proposal shall be considered as a single item for purposes of computing overhead and profit.
- 9.2.5 When Contractor is directed to proceed on a time and materials basis, costs of the work shall be submitted daily for approval by Project Representative and may only include:
 - A. Actual payroll costs for employees, as substantiated by time cards, in the direct employ of Contractor for the times actually utilized in prosecution of the additional work, including allowance for benefits which Contractor customarily provides its employees;
 - B. The actual substantiated cost to Contractor for all material and equipment incorporated into the work, including transportation and storage expenses;
 - C. The actual substantiated amounts of payments by Contractor to subcontractors for work performed by the subcontractors;
 - D. Any costs of special consultants to the extent authorized by Owner;
 - E. Substantiated equipment rental costs at reasonable market rates;
 - F. Additional supervision and travel costs reasonably related to the work performed;
 - G. Increased bond premiums;
 - H. Additional license fees, permits, or applicable taxes;
 - I. Minor incidental expenses such as telegrams and long distance telephone charges.

To these direct costs shall be added the allowable combined overhead and profit as provided in ARTICLE 9.4.

- 9.2.6 Unless specifically agreed to by Owner in writing, the cost of additional work shall not include any portion of Contractor's general overhead, nor any sum attributable to Contractor's prosecution and supervision of the principal work at the site, nor any overtime expense, unless specifically agreed to by Owner in writing. Contractor shall not be compensated for any casualty or other losses or expenses attributable to negligence of Contractor or any person in its employ or any subcontractor or supplier.
- 9.2.7 Payment to Contractor shall be made only for the actual quantities of work performed and accepted or materials furnished, in conformance with the contract or applicable change order. When the accepted quantities of work or materials vary from the quantities stated in the bid schedule, Contractor shall accept as payment in full, payment at the original contract unit prices for the quantities of work and materials furnished, completed and accepted; except as provided in the Contract Documents.

9.3 UNIT PRICES

- 9.3.1 When unit prices are used, and where the final quantity of a major contract item varies more than 25% above or below the bid quantity, either party to the contract may request an equitable adjustment in the contract unit price of that item. A major contract item is an item equal to 10% or more of the total contract.
- 9.3.2 When the final quantity of work is less than 75% of the bid quantity, the equitable adjustment shall be made for those units of work done and accepted, except that the total payment for the item shall not exceed 75% of the total amount bid for the item.
- 9.3.3 To determine unit prices for authorized changes or additions in the work that alter the quantity of work under a lump sum pay item, adjustment to the pay item will be determined by multiplying the added or deleted quantity by the quotient of the contract lump sum price and the estimated quantity shown on the original plans. Payment will be made under a new contract item established for that purpose. Adjustments will be made as a change order to the contract.
- 9.3.4 No allowance shall be made for any increased expenses, loss of expected reimbursement or loss of anticipated profits suffered or claimed, either directly from such alterations in quantities or indirectly from unbalanced allocations among the contract items by Contractor, or any other causes.

9.4 ALLOWABLE OVERHEAD AND PROFIT

- 9.4.1 When the value of change order work is determined by the lump sum method or by the time and materials method, the following definitions and percentages shall apply.
- 9.4.2 Direct costs are defined as the net cost to Contractor to accomplish a given change. Costs of bonds and insurance associated with the change shall be applied after addition of indirect costs.
- 9.4.3 Indirect costs are defined as general operational charges relating to the accomplishment of a given change, including but not limited to small tools, incidental job burdens and general office expense.
- 9.4.4 Overhead and Profit: Allowances for all indirect costs shall be identified as combined overhead and profit and shall not exceed the percentages in the following schedule:
 - A. Additive work:
 - (1) Prime Contractor:

- (i) 15% of the direct costs of own work in excess of \$1,000.00; 20% when the total value of own work is equal to or less than \$1,000.00.
- (ii) 8% of the direct costs of work performed by subcontractors not including subcontractor's overhead and profit.
- (iii) 8% of the direct costs of equipment.
- (2) Subcontractors: percentages represented in subsections (a) and (b) are a maximum percentage allowed regardless of the tier or number of subcontractor(s) performing the work:
 - (i) 15% total of the work performed by subcontractors in excess of \$1,000.00; 20% total of the work performed by subcontractor equal to or less than \$1,000.00.
 - (ii) 8% of the direct costs of equipment.
- (3) In no case shall overhead and profit exceed 23% of the direct costs of work or 16% of the direct costs of equipment when the cost of the work exceeds \$1,000.00. In no case shall overhead and profit exceed 28% of the direct costs of work or 16% of the direct costs of equipment when the cost of the work is equal to or less than \$1,000.00.
- B. Deductive work:
 - (1) Prime Contractor: 4% of the direct cost of deleted own work.

9.5 CONCEALED CONDITIONS

- 9.5.1 This ARTICLE applies only when concealed conditions substantially at variance with the conditions set forth in the Contract Documents are encountered and these conditions were not foreseeable by Contractor or reasonably inferable from information provided by Architect or Owner in the bidding documents.
- 9.5.2 If it is determined the Contractor could not predict the concealed conditions as set forth under ARTICLE 9.5.1, Owner may issue a change order for the performance of additional work required with an equitable adjustment in the contract sum. Contractor shall not begin work upon any concealed condition until Owner has approved a written change order

ARTICLE 10 TESTING AND CORRECTION OF WORK

10.1 TESTS AND INSPECTIONS

- 10.1.1 Contractor shall be responsible for securing permits and approvals as set forth under ARTICLE 4.11 from entities having jurisdiction over the work. Owner may provide any special testing or inspections required by the Contract Documents. Contractor shall not cover work that requires testing, inspection or approval until such testing, inspection, or approval has been completed.
- 10.1.2 Contractor shall give Owner timely notice of readiness of the work for all inspections, tests or approvals. Minimum time required for giving notice of readiness will be agreed upon by Owner and Contractor prior to work commencing.
- 10.1.3 Neither observation by Owner nor inspections, tests, or approvals by Owner or Owner's testing agency shall relieve Contractor from Contractor's obligation to perform the work in accordance with the Contract Documents.

10.2 UNCOVERING OF WORK

10.2.1 If any work is covered or buried contrary to contract requirements or Owner's written request, such work shall be uncovered at Owner's request for inspections, tests or approvals. Uncovering and recovering shall

be at Contractor's expense, unless Contractor has given notice of intent to cover the work and Owner has not acted with reasonable promptness to provide any necessary tests, inspections or approvals.

10.2.2 If any work has been covered which Owner has not specifically requested to observe prior to covering, or if Owner considers it necessary or advisable that covered work be inspected or tested by others, then Contractor shall, at Owner's request, uncover, expose or otherwise make available for observation, inspection, or testing, that portion of the work as Owner may require. Contractor shall furnish all necessary labor, materials and equipment. If such work is found to be defective, Contractor shall bear all expenses, including compensation for any additional professional services and testing. If, however, the uncovered work is found not to be defective, Contractor shall be allowed an equitable adjustment in the contract price or the Contract Time. Only Contractor's direct costs attributable to the uncovering of work and its recovering shall be allowed.

10.3 DEFECTIVE WORK

- 10.3.1 All work not meeting the requirements of the Contract Documents shall be considered defective.
- 10.3.2 Contractor shall promptly correct or replace any defective work. Any and all costs associated with correction or replacement shall be borne by Contractor. Contractor shall also bear the expense of making good all work of others destroyed or damaged or required to be redone because of the correction or replacement of defective work.
- 10.3.3 If, after seven (7) days written notice to Contractor, Contractor fails to correct deficiencies or to provide Owner with an approved schedule for correcting defective work, Owner may, without prejudice to any other remedy it may have, correct deficiencies and deduct the cost thereof from the payment then or thereafter due Contractor. No extensions of time shall be allowed for correction of work that is defective.

ARTICLE 11 WARRANTIES

- 11.1 Contractor unconditionally warrants for a period of one year from issuance of the Certificate of Substantial Completion the usability and quality of all work, labor and materials incorporated into the project, unless otherwise provided in the Contract Documents. After the approval of Final Payment and prior to the expiration of one year after the date of Final Completion, any work found to be defective shall be remedied promptly by Contractor within fourteen (14) days of written notice without cost to Owner and in accordance with Owner's written instructions. Contractor shall either correct such defective work, or, if it has been rejected by Owner, remove it from the site and replace it with acceptable work. If Contractor does not promptly comply with the terms of Owner's instructions, Owner may have the defective work corrected or the rejected work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, shall be deducted from Warranty Period Payment or paid by Contractor to Owner, unless the surety elects to remedy deficiency.
- 11.2 In addition to other warranties set forth in this contract and in accordance with requirements stated in the Contract Documents, Contractor shall obtain and transmit to Architect all warranties on material and equipment incorporated into the work and either provided by the supplier or otherwise required by the Contract Documents. Transmittal of warranties to Owner shall be a prerequisite of the Certificate of Final Completion.
- 11.3 All material and equipment installed by Contractor shall have a manufacturer's warranty for a period of one year, except as otherwise provided by the Contract Documents. The period of warranty shall begin on the date of Substantial Completion unless otherwise noted on the Certificate of Substantial Completion. This

article does not limit any manufacturer's warranty which extends for a period of time longer than that specified as minimum in the Contract Documents.

- 11.4 If a warranty period in excess of one year on a particular item or part of the work is required by the Contract Documents, the longer warranty period shall govern warranty obligations of Contractor.
- 11.5 Owner may accept defective work or materials found during the warranty period instead of requiring correction or removal and replacement. If acceptance occurs prior to approval of final payment, a change order shall be issued to reduce the contract price. If acceptance occurs after approval of final payment, an appropriate amount shall be paid by Contractor to Owner.
- 11.6 The provisions of this ARTICLE shall not be construed as limiting the right of Owner to make a claim against Contractor for work not constructed in accordance with the Contract Documents. Where a defect attributable to Contractor's or subcontractor's materials or workmanship appears after expiration of the one-year warranty period, Owner shall notify Contractor of the appearance of damages due to defective work or materials and shall offer Contractor the right to replace or repair all defective work and other work using Contractor's forces. If Contractor refuses to correct the work and any consequentially damaged work within a reasonable time, or if Contractor refuses to correct the work, Owner may correct the work utilizing Owner's own forces. Contractor shall pay Owner all costs attributable to correction of the defective work and any consequential damages occasioned by the defective work.
- 11.7 Should Owner and Contractor agree to delay completion of any items, the one-year warranty period for those items shall commence upon written acceptance of each item by Owner.

ARTICLE 12 CLAIMS AND LITIGATION

- 12.1 This contract shall be governed by the laws of the State of Alaska, and any lawsuit brought thereon shall be filed in the Third Judicial District at Kenai, Alaska.
- 12.2 No controversy or claim arising out of this contract shall be subject to binding arbitration unless both Owner and Contractor agree in writing to submit the question to arbitration at the time when the controversy arises.
- 12.3 All claims, disputes and other matters in question between Contractor and Owner relating to the execution or progress of the work shall be referred initially to Project Representative, who shall render a recommendation in writing to Owner within a reasonable time.
- 12.4 During pendency of any claim arising out of this contract, Contractor shall carry on the work and maintain the Progress Schedule approved by Owner unless otherwise agreed by Contractor and Owner in writing. Should Contractor cease work, Contractor shall be in breach of this contract and Owner shall have the right to terminate the contract and to prosecute the work to completion with Owner's own forces or with a replacement Contractor. Contractor shall be responsible for any increase in costs to Owner above the contract price.
- 12.5 Contractor may make claims for additional costs only if the additional cost involved has occurred because of:
 - A. A change order issued by Owner, where the additional sum due Contractor set forth in the change order is in dispute.
 - B. An order by Owner to stop the work where Contractor was not at fault.
 - C. Concealed conditions as set out in ARTICLE 9.

- D. Failure of payment by Owner pursuant to ARTICLE 3.
- E. Additional costs or delays caused by separate contractors' or Owner's forces in accordance with ARTICLE 6.
- 12.6 Contractor shall not make a claim for additional costs where the basis of the claim lies in an oversight or mistake made by Contractor during the bidding process or by reason of negligent acts or omissions of Contractor or any mistake in judgment or improper selection of construction means, methods, sequences and materials during the course of construction.
- 12.7 If Contractor is entitled to make claim for an increase in the contract sum, Contractor shall deliver to Owner written notice of Contractor's intention to assert each claim within twenty (20) days after occurrence of each event giving rise to the claim. Contractor must give this notice of claim and specify the full extent and nature of the claim(s) to Owner before proceeding to execute the work upon which a claim might be asserted. No claim for additional costs or compensation shall be valid unless the prior twenty (20) day notice has been given. Adherence to this provision shall be strict. Any adjustment in the contract sum resulting from settlement of claims shall be authorized by change order.

ARTICLE 13 TERMINATION OF THE CONTRACT OR SUSPENSION OF THE WORK

13.1 TERMINATION BY OWNER

- 13.1.1 Termination for Default
 - A. Owner may terminate, without prejudice to any right or remedy of the Owner, the Work, or any part of it, for cause upon the occurrence of any one or more of the following events:
 - (1) Contractor fails to prosecute the Work or any portion thereof with sufficient diligence to ensure Substantial Completion of the Work within the Contract Time;
 - (2) Contractor fails to prosecute the Work or any portion thereof with sufficient diligence to ensure Final Completion of the Work in a timely manner;
 - (3) Owner shall have the right to terminate the contract if Contractor should file for bankruptcy, reorganization, otherwise be declared insolvent, or if Contractor makes a general assignment for the benefit of creditors. Exercise of these rights, where required by law, is contingent upon relief from the automatic stay provisions of the United States Bankruptcy Court or through other appropriate court order;
 - (4) Contractor fails in a material way to prepare, replace or correct Work not in conformance with the Contract Documents;
 - (5) Contractor repeatedly fails to supply skilled workers or property materials or equipment;
 - (6) Contractor repeatedly fails to make prompt payment to its employees or Subcontractors;
 - (7) Contractor materially disregards or fails to comply with laws, ordinances, rules, regulations, permits, easements or orders of any public authority having jurisdiction;
 - (8) Contractor fails to comply with safety requirements in the Contract Documents;
 - (9) Contractor fails to adhere in all respects to the provisions of Title 8, Chapter 30, of the Alaska Administrative Code and Title 36 of the Alaska Statutes as applicable to this contract and all

other pertinent statutes, ordinances or regulations or orders of any local, state, or federal authority concerning payment;

- (10) Contractor, if after seven (7) days written notice, without prejudice to any other remedy of Owner, fails to correct to Owner's satisfaction deficiencies in the Work that does not conform to the Contract Documents;
- (11) Contractor is otherwise in material breach of any provision of the Contract Documents.
- B. If the Owner reasonably believes that one of the aforementioned events has occurred, the Owner will provide the Contractor with written notice of its intent to terminate the Contractor for default, specifying within such notice the grounds for such termination. The Owner, at its option, shall require the Contractor to either promptly correct the deficiencies noted in the Owner's intent to terminate or provide the Owner with a corrective action plan as to how such deficiencies will be remedied or cured in a timely fashion. Notwithstanding, if after receipt of the proposed, the Owner has a reasonable basis for concluding that the Contractor has (a) failed or is unwilling to repair, replace, or correct the deficiencies, or (b) failed or is unwilling to provide a reasonable and satisfactory corrective action plan, the Owner shall thereafter have the right to immediately terminate the Contract for default.
- C. Upon termination, the Owner may at its option:
 - (1) Take possession of the site and possession of or use all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor; and/or,
 - (2) Finish the Work by whatever other reasonable method it deems expedient; or,
 - (3) Call upon the surety to perform its obligations under the performance and payment bonds, if applicable. If applicable, the performance bond surety shall commence performance within fourteen (14) days of the termination or default. If the surety does not arrange for or commence performance by that date, Owner shall have the option to complete or arrange for performance and the surety shall not be relieved of any responsibility for payment of costs of performance.
- D. The Contractor and its sureties shall be liable for all damages and costs including but not limited to:
 - (1) Compensation for architect and engineering services and expenses made necessary thereby;
 - (2) Any other costs or damages incurred by the Owner in completing and/or correcting the Work; and
 - (3) Any other special, incidental or consequential damages incurred by the Owner which results or arises from the breach or termination for default.
- E. In the event of termination for default the Owner shall pay the Contractor for Work successfully completed and accepted by the Owner prior to the date of termination. The Owner shall not be responsible for any Contractor costs, expenses, or damages including any consequential, special or incidental damages or lost profits associated with the Agreement and/or Contract Documents. In no event shall the Owner reimburse the Contractor for any costs directly or indirectly related to the cause of this termination for default. Owner shall have the right of set-off, from any payment due Contractor, for all expenses, costs, and damages including but not limited to all professional and legal expenses and attorneys' fees and costs or other additional expenditures necessary to complete

the projects that are occasioned by the termination. In the event such amounts exceed the amount of payment withheld, Contractor shall be liable to Owner for such amounts. No payment shall be made to Contractor prior to determination that a balance is due Contractor after the amount of setoff is determined.

- F. If, after termination for default, it is determined that the Contractor was not in default, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the Owner.
- G. The rights and remedies of the Owner in this provision are in addition to any other rights and remedies provided by law or the Contract Documents.
- 13.1.2 Termination for Convenience
 - A. Upon written Notice the Owner may terminate the Work, or any part of it, without prejudice to any right or remedy of the Owner, for the convenience of the Owner if termination is deemed to be in the best interest of the Owner.
 - Β. If the Owner terminates the Work or any portion of thereof for convenience, the Contractor will be directed to make all necessary preparations for closing out the project and for safeguarding Owner's materials and the work already completed. Contractor will be paid for all conforming work done to date and for all materials delivered to the site and already paid for by Contractor, together with all reasonable costs directly attributed to termination, including fixed overhead. Contractor shall be responsible for minimizing the extent of such expenses and shall **not** be paid for expenses which could have been reasonably avoided. On the date that notice of termination or suspension for convenience is issued, Contractor shall immediately take all actions necessary to stop orders of material, rental of equipment or premises, employment of persons on the project, and shipment of materials not yet delivered to the site. The notice of termination or suspension for convenience shall specify a date by which all steps necessary for termination shall be completed and by which Contractor shall have removed any unused material and all Contractor's equipment and forces. Contractor shall leave the premises in a clean and safe condition on or prior to the date specified in the notice. Owner shall certify that all termination procedures have been completed and that the premises have been turned over to the possession of Owner. Within fifteen (15) days after that certification by Owner, Contractor shall render to Owner a bill for all expenses incurred in termination and for all work done subsequent to the last progress payment. Owner shall pay Contractor all sums properly due, together with any retainage not necessary to cover apparently nonconforming work or other changes, within fifteen (15) working days after the bill has been received by Owner, provided that Owner has received releases for all liens.
 - C. The Contractor shall not be entitled to any other costs or damages, whatsoever. The total sum payable upon termination shall not exceed the Contract Price reduced by prior payments.
- 13.1.3 Where an emergency situation creating a danger to person or property arises, Owner may, at its option, terminate the contract and take possession of the site and any of Contractor's equipment and material necessary to complete an emergency response or hire a separate contractor to complete the emergency response. Contractor shall be paid the contract rate for the material used and shall be paid for the use of Contractor's equipment at the price shown in the Contract Documents or at the rate for such equipment listed in <u>RENTAL RATE BLUE BOOK FOR CONSTRUCTION EQUIPMENT</u>, published by Machinery Information Division of K-III Directory Corporation, 1735 Technology Drive, Suite 410, San Jose, California 95110. If the rate for such equipment is not so listed, reliable sources will be used to determine a reasonable rate.

13.1.4 Should Owner elect to terminate Contractor's services prior to Final Completion of the work, such termination shall not affect any rights Owner might assert against Contractor at time of termination or thereafter. Any retention or payment of monies by Owner to Contractor shall not release Contractor from that liability.

13.2 SUSPENSION OF THE WORK

13.2.1 Owner may, at any time and for any reason, suspend the work or any portion of it for a period not to exceed ninety (90) days, by written notice delivered to Contractor thirty (30) days prior to the date fixed for suspension. The notice of suspension shall fix the date on which the work is to be resumed and Contractor shall resume the work on the date so fixed. Equitable adjustment in the contract price, the Contract Time, or both shall be made for cost or delay directly attributable to suspension of the work.

13.3 TERMINATION BY CONTRACTOR

13.3.1 If through no act or fault of Contractor, Owner orders a suspension of work for a period of more than ninety (90) days, Contractor may, upon thirty (30) days written notice to Owner, terminate this contract and recover from Owner payment for work accepted to date plus purported overhead and profit in the manner provided in ARTICLE 9.4. Contractor shall also have the right to terminate this contract if Owner fails within forty-five (45) days to pay amounts properly due Contractor for satisfactorily accomplished work, so certified by Project Representative, as due and payable. The provisions of this section do not include amounts ordinarily retained from Contractor's Application for Payment or amounts retained because of unsatisfactory, defective, or incomplete work, or for any other reason provided in the Contract Documents.

ARTICLE 14 MISCELLANEOUS PROVISIONS

- 14.1 Whenever any provision of the Contract Documents requires written notice, such notice shall be deemed to have been given and binding when given by certified mail to the respective party at the address provided in the Legal Notice provision of the agreement section of the Contract Documents.
- 14.2 Neither party may assign this contract without the written consent of the other party. Contractor may not delegate duties under this contract other than as provided in the Contract Documents without the prior written consent of Owner.
- 14.3 In the event a provision of the Contract Documents is found to be unenforceable or void for any reason, it shall be considered as severed from the Contract Documents, and the remaining portions of the Contract Documents shall stand as if that provision had never been included in the Contract Documents. In the event the unenforceable or void provision is legally essential to the continuing existence of the contract, the parties shall attempt to substitute a reasonable replacement provision.
- 14.4 <u>No general condition stated in these provisions or other provision in the Contract Documents lessens,</u> <u>alters, or makes inapplicable the requirement for indemnification stated in ARTICLE 4.13. In the</u> <u>event of conflict between any contract provisions, the requirements set out in ARTICLE 4.13 control.</u>

END GENERAL CONDITIONS

PART IV

TITLE 36 WAGE SCHEDULE

Retrieve current schedule from: www.labor.state.ak.us/lss/pamp600.htm

DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT ONLINE FILING:

> NOTICE OF WORK https://certpay.dol.alaska.gov/portal.aspx

NOTICE OF COMPLETION OF PUBLIC WORKS https://certpay.dol.alaska.gov/portal.aspx

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SECTION 01 01 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - Work required under this contract is described in the subsequent sections and is more particularly delineated in the Drawings, and includes the providing of all labor, equipment, tools, and materials required for the NIKISKI FIRE STATION #3 as described in this and subsequent sections and in other Contract Documents.
 - 2. The Contract Documents do not purport to describe in detail, absolute and complete construction information. In some instances, drawings will be diagrammatic and not necessarily to exact scale or portray exact conditions at any particular location or situation.
 - 3. It shall be the responsibility of the Contractor to determine conditions and requirements at each particular situation and provide all items necessary for the completion of the Work, according to the parameters established by the Contract Documents.
- B. Language:

The language employed in these specifications is addressed directly to the Contractor. Imperative or indicative language is generally employed throughout and requirements so expressed are the mandatory responsibility of the Contractor even though the work specified actually may be accomplished by specialty subcontractors hired, retained, or otherwise engaged by the Contractor. References to third parties in this regard shall not be interpreted in any way as to relieve the Contractor of any of his responsibilities under the Contract.

1.02 QUALITY ASSURANCE

A. Qualifications of workers:

For all the operations under this Contract:

- 1. Employ a thoroughly qualified and experienced superintendent who shall be completely familiar with the requirements of the Contract Documents, who shall direct all work, and who shall be present at the job site at all reasonable times while work is in progress.
- 2. Employ only qualified journeymen mechanics, tradesmen, or installers who are thoroughly skilled and experienced in their respective trades or specialties.

- 3. Apprentices and helpers, when employed, shall be under the supervision of qualified journeymen mechanics or tradesmen at all times.
- B. Referenced Standards:

Standards referenced in this and succeeding sections of the specifications shall become a part of the Contract Documents to the extent of their applicability to the particular item, process, method or operation involved.

1.03 CONTRACTOR'S DUTIES

- A. Except as otherwise specifically required, provide and pay for labor, materials, tools, machinery, equipment, and all transportation.
- B. Comply with codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of the work.
- C. In the event of any observed variation between the Contract Documents and legal requirements, or any discrepancy or ambiguity in or among any of the requirements of the Contract Documents or any referenced standards, promptly notify the Owner's Representative in writing in which eventuality, appropriate changes and modifications to the Contract Documents will be initiated by the Owner and furnished to the Contractor. Contractor shall assume responsibility for work performed without proper notice to Owner, when such work was known by Contractor to be contrary to such requirements. Do not proceed in questioned areas until resolution or clarification has been obtained.

1.04 PREMISES

A. Contractor's Access:

The Owner will make available at the indicated locations, interior and exterior space, as reasonable, for the storage and staging of the Contractor's materials and equipment, subject to the following controls.

- 1. Use of such areas shall be covered by the insurance required by the General Conditions (Provisions).
- 2. Storage shall be maintained in a neat and orderly condition at all times conforming to all fire and safety regulations.
- 3. Fire lanes and required exit pathways shall be kept free and unobstructed at all times.
- 4. Do not unreasonably encumber site with materials and equipment.

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- 5. Do not impose loads which might impair the structural integrity of any work already in place.
- 6. Use of interior space shall be coordinated with and subject to the requirements of the Owner.
- 7. Upon completion of the contract, restore all areas to original conditions which prevailed prior to onset of the work, or as otherwise provided in the Contract Documents.
- B. Environmental Requirements:
 - 1. Restrict all operations to the areas assigned for storage, staging, and other necessary operations, and do not permit the disturbance of any areas not assigned for approved operations shown as limits of construction under this Contract.
 - 2. The areas indicated on the drawings where existing natural vegetation remains is to be protected by the Contractor. The Contractor shall cordon-off these areas. They are not to be used by the Contractor for storage of materials, access of any other purpose. Damage to the natural ground cover in these areas will be restored to the satisfaction of the Architect.
 - 3. Employ all means necessary to avoid the accumulation of debris and construction residue, avoiding the spread of dust and noxious odors.

PART 2PRODUCTS

2.01 STORAGE AND PROTECTION

- A. Do not deliver any of the materials or equipment for this Contract to the job site until adequate facilities are available for their proper storage and protection. Comply with the detailed requirements in subsequent sections for the storage and protection of the particular products of those sections.
- B. Take all measures necessary to protect the installed work and materials of all trades at all times before, during, and after installation.

2.02 MATERIALS AND EQUIPMENT

A. Design:

Design is based upon the method system, or product described, and the Drawings reflect the desired location and configuration. In some instances, the recommended installation details of the named manufacturer, comparable methods systems or products of alternate manufacturers will be considered (unless otherwise noted as "No Substitution") upon submittal per Sections 01 63 00 of these specifications.

B. Materials:

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All materials proposed for incorporation into this project shall be new and as specified or as shown in the Drawings, or if not specifically called out, shall be of first quality of their respective kinds, as selected by the Contractor, subject to the approval of the Owner's Representative.

C. Minimum Quality:

In every instance the quality level shown or specified is intended as the minimum acceptable for the work to be performed or provided.

D. Conflicting or Overlapping Requirements:

In the event of conflict in or among any of the requirements of this specification or any referenced standards, or where two or more referenced standards or sets of requirements are specified, and establishes differing minimums of levels of quality, the most stringent requirement shall prevail and shall be so enforced, unless specific language in the text (not in the referenced standards) clearly indicates that the less stringent requirement is intended to prevail.

E. Submittals:

Make all submittals of materials and equipment proposed for incorporation into the Work in accordance with Section 01 34 00 and the specific requirements of other individual sections of these specifications.

PART 3 EXECUTION

3.01 JOB CONDITIONS

A. Inspection:

Do not commence any phase of the Work until all previous work has been examined and it has been determined that subsequent operations may be executed in a timely and orderly manner and in complete accordance with the original design, the approved submittals, and all applicable codes and regulations.

B. Installer's Certification:

Where directed in subsequent sections, obtain written certification from subcontractors or installers that substrates affecting their operations have been examined and found satisfactory for further work. Submittal of such certification, countersigned by the Contractor, shall be a condition for acceptance of that particular installation or phase of work.

C. Discrepancies:

In the event of discrepancy, ambiguity, conflict, interference, or any other unanticipated condition or situation which might impede timely execution of the Work,

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immediately notify the Owner's Representative and do not proceed in questioned areas until resolution or clarification has been obtained.

D. Repairs and Replacements:

In the event of damage to any part of any installed material, equipment, assembly, or system, make all repairs or replacements necessary to restore the original undamaged condition. Do not allow damaged material to be incorporated into the Work. Repairs and replacements shall be subject to the approval of the Owner's Representative and shall be accomplished at no additional expense to the Owner.

3.02 INSTALLATION

Install all work in complete accordance with the original design, the approved submittals, and all applicable codes and regulations. Perform all work under the direction of qualified supervisors, foremen, or leadmen, and do not permit any phase of the work to be commenced by subcontractors or subcontractors without qualified supervisors present to direct their operations.

3.03 GUARANTEES AND WARRANTIES

In addition to the requirements given in the General Provisions, the Contractor shall extend to the Owner such other bond, warranty, or manufacturer's guarantee offered by any vendor, manufacturer, or other supplier on any material, goods, equipment, or workmanship included in the Work.

END OF SECTION
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SECTION 01 02 70

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Application for Payment Procedures: Submit Application for Payment to the Owner's Representative in accordance with the schedule established by the General Conditions of the Contract and Agreement Between Owner and Contractor.
- B. Related Documents and Sections Described Elsewhere:
 - 1. Agreement Between Owner and Contractor.
 - 2. General Conditions, Article 8 "Measurement, Payment and Completion."
 - 3. Section 01 37 00 Schedule of Values
 - 4. Section 01 70 00 Contract Close-out Procedures

1.02 FORMAT AND DATA REQUIRED

- A. Submit applications using AIA Document G702 or in a form acceptable to the Owner.
- B. Provide itemized data on continuation sheet using AIA Document G703 or in a form acceptable to the Owner using the Schedule of Values accepted by the Owner's Representative.

1.03 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form:
 - 1. Fill in required information, including that for change orders executed prior to date of submittal of application.
 - 2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
- B. Continuation Sheets:
 - 1. Fill in total list of scheduled component items of work with item number and scheduled dollar value for each item.
 - 2. Fill in dollar value in each column for each scheduled line when work has been performed or products stored.

- a. Round off values to nearest dollar, or as specified for Schedule of Values.
- 3. List each change order executed prior to date of submission at the end of the continuation sheets.
 - a. List by change order number and description, as for an original component item of work.

1.04 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. Contractor shall submit suitable information, with a cover letter identifying:
 - 1. Project Name
 - 2. Application number and date
 - 3. Detailed list of enclosures
 - 4. For stored products:
 - a. Submit separate recap for all stored materials included in Application for Payment.
 - b. All stored materials listed in recap shall be substantiated by invoices for the material and copies of the invoices shall be attached to the recap. If any stored materials are being claimed which are not stored in the construction site, itemized listing shall show location where materials are stored and such location shall be available for inspection of the materials. Contractor shall show proof of adequate insurance for material stored off-site. The Contractor shall request approval of any location for stored material, other than the construction site, prior to submittal of Application for Payment.
 - c. Stored material prices shall include cost of material, related freight costs, and applicable taxes; all of which must be substantiated by invoice.
 - 5. Provide completed forms for Payment Request and Proof of Payment for subcontractors and suppliers.
- B. Submit one copy of data and cover letter with each copy of application.
- C. A copy of each of the subcontractor and supplier request form and a stored materials form.

1.05 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in application form as specified for progress payments.

- B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01 70 00 Contract Close-out Procedures.
- 1.06 SUBMITTAL PROCEDURE
 - A. Submit Applications for Payment to Project Representative at the times stipulated in the General Condition, Article 8.
 - B. Number: Three copies of each application.
 - C. When Owner's Representative finds application properly completed and correct, the Certificate for Payment will be transmitted to the Owner with copy of the transmittal letter.

PART 2PRODUCTS (not used)

PART 3EXECUTION (not used)

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SECTION 01 03 00

ALTERNATES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included:

- 1. The purpose of this section is to establish a method by which the Owner may adjust the extent of the project according to the prevailing costs at the time of proposing. Certain alternatives have been established as shown in the Drawings and described below to enable the Owner's decision to be made prior to award of the Contract.
- 2. The numbered order in which the deductive alternates appear is the order in which they may be added to the basic Proposal.

The Owner may take alternates in the order shown until at least one of the responsive proposals, results in a price within the funds announced as available.

This section takes precedence over all other descriptions of the work as described in PART 3, EXECUTION. Descriptions therein are not intended to be all inclusive, but to define in general terms each alternative item.

- B. Related Work Described Elsewhere:
 - 1. The Drawings and pertinent sections of these Technical Specifications describe the materials and methods required for and the limits of the various alternatives.
 - 2. The method of stating the proposed Contract sum for each of the various alternatives is described in the Proposal Form.

1.02 SUBMITTALS

After the alternatives, (if any), have been selected and the Contract has been awarded, make submittals in accordance with Section 013400 of these specifications. Include all items in the selected alternative which may not have been included in the Basic Proposal. Submittal required by this section shall be made in addition to those provided for in Section 013400 and subsequent sections.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION

3.01 HANDLING

If the Owner elects to proceed on the basis of one or more of the alternatives, make all modifications required, including the provision of all materials and labor necessary to perform the work according to the parameters described in the selected alternative(s) and shown in the Drawings. The contractor shall have approval of the Owner's Representative with no additional cost to the Owner other than as proposed in the Proposal Form and included in the Contract amount.

DIVISION 01 SECTION 01 03 00 ALTERNATES

3.02 DESCRIPTION OF ALTERNATES

Additive Alternate No. 1: Cost to provide all labor, materials and equipment required for the Gasoline and Diesel Fuel Tanks, as called for in the drawings and specifications.

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SECTION 01 05 20

GRADES, LINES AND LEVELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Property lines, bench marks, existing and proposed grades, and improvements are indicated on Drawings.
- B. Lay out Work and provide lines and measurements for the Work.
 - 1. Verify adjustments required due to existing improvements, adjoining property rights, good appearance, and proper drainage.
- C. Take necessary measurements as far in advance of required installation as practical. Verify measurements given on Drawings.
 - 1. Report promptly variations and discrepancies to Owner's Representative.
 - 2. Verify incomplete or non-closing dimensions with Owner's Representative.
- D. Dimensions on Drawings take precedence over scaled dimension. Where dimensions are not given, scaled dimensions to nearest point of reference may be used subject to verification of Owner's Representative.

1.02 SURVEYS, LINES AND LEVELS

- A. Provide services of a registered civil engineer or registered land surveyor with a minimum of 5 years' experience in Alaska, acceptable to Owner's Representative and licensed in the State of Alaska, to lay out work.
 - 1. Establish interior and exterior construction and control lines.
 - 2. Set grades using:
 - a. Grade stakes
 - b. Slope stakes
 - c. Finish grade stakes
- B. Provide all layout and construction lines and grade staking required for type of work being performed according to normal engineering procedures.
- C. Maintain construction lines and grade staking in condition to assure accurate and proper control of work and to verify final grades and construction lines.
 - 1. Establish and safeguard additional bench marks in at least two widely separated places.

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2. Establish axis lines showing exact floor elevations and other lines, dimensions and reference points as required for information and guidance of all trades.

1.03 SUBMITTALS

- A. Take settlement readings of work, unless waived by owner.
 - 1. At predetermined number of points selected by Owner's Representative.
 - 2. Weekly until work is completed or until such time as directed.
- B. Record all survey data and make available to Owner's Representative.
- C. Submit certificate signed by registered engineer or surveyor certifying elevations and improvements are in conformance with requirements of Contract Documents.
 - 1. Describe in detail and indicate on Project Record Documents all variation from Contract Documents.
 - 2. Include field survey notes starting date, name of surveyor or foremen, and adequate description of temporary bench marks when used.
 - a. Orient sketches with north arrow and show relationship and ties to stationing control.
 - b. Reduce notes to show actual elevations at design datum.
 - 3. Base horizontal control, for Project Record Documents information, on stationing system shown. Use design datum for all elevations.

PART 2PRODUCTS (Not Used)

PART 3EXECUTION (Not Used)

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SECTION 01 06 00

REGULATORY REQUIREMENTS

PART 1 GENERAL

- 1.01 BUILDING CODES
 - A. Construction which is not governed by a local building code or the Contract Documents will be governed by the more stringent provisions of the latest published, Statute adopted edition, of the following applicable codes:

2018 International Building Code 2014 National Electrical Code 2012 International Plumbing Code

2012 International Mechanical Code 2012 International Fire Code

2012 International Energy Conservation Code 2012 International Fuel Gas Code Chapters 6 & 7 Americans with Disabilities Act (ADA)

Accessibility Guidelines for Buildings and Facilities NFPA 13, 70, 72, 101, 110, 415 and 780

- B. Construction Type: VB
- C. Occupancy Type: A-2, A-3, B and S-1

1.02 APPLICABLE STANDARDS

- A. Where indicated, comply with requirements and recommendations of referenced standards and other publications, except to extent more detailed or more stringent provisions are required by applicable codes and governing regulations.
- B. Where two or more standards or recommendations of trade associations apply to same quality control requirement for work, comply with most stringent. Refer uncertain instances to Owner's Representative.

1.03 FEES AND PERMITS

A. Comply with requirements of Contract General Conditions and Supplementary Conditions.

PART 2PRODUCTS (not used)

PART 3EXECUTION (not used)

PAGE 1 OF 5

SECTION 01 09 00

REFERENCE STANDARDS

PART 1 GENERAL

- 1.01 SECTION INCLUDES
 - A. Quality assurance
 - B. Schedule of references

1.02 RELATED SECTIONS

A. General Conditions

1.03 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of the Bid date, except when a specific date is specified.
- C. Obtain copies of standards when required by Contract Documents.
- D. Maintain copy at jobsite during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Owner's Representative before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 SCHEDULE OF REFERENCES

AA	Aluminum Association 818 Connecticut Avenue, NW Washington, DC 20006
AABC	Associated Air Balance Council 1000 Vermont Avenue, NW Washington, DC 20005
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, NW Washington, DC 20001

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ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219	
ADC	Air Diffusion Council 230 North Michigan Avenue Chicago, IL 60601	
AGC	Associated General Contractors of America 1957 E Street, N.W. Washington, DC 20006	
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740	
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, DC 20006	
AISC	American Institute of Steel Construction 400 North Michigan Avenue Eighth Floor Chicago, IL 60611	
AISI	American Iron and Steel Institute 1101 17 Street, N.W Washington, DC 20036	
AITC	American Institute of Timber Construction 333 W. Hampden Avenue Englewood, CO 80110	
AMCO	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004	
ANSI	American National Standards Institute 11 W. 42st New York, NY 10036	
APA	American Plywood Association Box 11700 Tacoma, WA 98411	
ARI	Air-Conditioning and Refrigeration Institute 1501 Wilson Boulevard Arlington, VA 22209	

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ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWI	Architectural Woodwork Institute 2310 South Walter Reed Drive Arlington, VA 22206
AWPA	American Wood-Preservers' Association 7735 Old Georgetown Road Bethesda, MD 20014
AWS	American Welding Society 550 LeJune Road, NW Miami, FL 33135
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195
DHI	Door and Hardware Institute 7711 Old Springhouse Road McLean, VA 22102
FGMA	Flat Glass Marketing Association 3310 Harrison White Lakes Professional Building Topeka, KS 66611
FM	Factory Mutual System 1151 Boston-Providence Turnpike PO Box 688 Norwood, MA 02062
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section Washington Navy Yard, Bldg. 197 Washington, DC 20407

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GA	Gypsum Association 810 First St. N.E. Suite 510 Washington D.C. 20002
ICBO	International Conference of Building Officials 5360 S. Workman Mill Road Whittier, CA 90601
IEEE	Institute of Electrical and Electronics Engineers 345 East 47th Street New York, NY 10017
IMIAC	International Masonry Industry All-Weather Council International Masonry Institute 815 15 th Street, NW Washington, DC 20005
MIL	Military Specification Navel Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601
NCMA	National Concrete Masonry Association 2302 Horse Pen Road Herndon, VA 22071
NEBB	National Environmental Balancing Bureau 8224 Old Courthouse Road Vienna, VA 22180
NEMA	National Electrical Manufacturers' Association 2101 L Street, NW Washington, DC 20037
NFPA	National Fire Protection Association 1 Battery March Park Quincy, MA 02269
NFPA	National Forest Products Association 1250 Connecticut Ave, N.W. #200 Washington, DC 20036
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
PS	Product Standard US Department of Commerce Washington, DC 20203

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SDI	Steel Deck Institute PO Box 9506 Canton, OH 44711	
SDI	Steel Door Institute 712 Lakewood Center North 14600 Detroit Avenue Cleveland, OH 44107	
SIGMA	Sealed Insulating Glass Manufacturers Association 111 East Wacker Driver Chicago, IL 60601	
SMACNA	Sheet Metal and Air Conditioning Contractors' National Assoc. 8224 Old Court House Road Vienna, VA 22180	
SSPC	Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213	
TCA	Tile Council of America, Inc. Box 326 Princeton, NJ 08540	
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062	
WCLB	West Coast Lumber Inspection Bureau 6980 SW Varns Road Box 23145 Portland, OR 97223	
WWPA	Western Wood Products Association 1500 Yeon Building Portland, OR 97204	
PART 2PRODUCTS (not used)		

PART 3EXECUTION (not used)

K+A designstudios **SECTION 01 20 00**

PROJECT MEETINGS

PAGE 1 OF 4

PART 1 GENERAL

- 1.01 DESCRIPTION
 - Α. Owner's Representative shall conduct Preconstruction Conference and close out review meetings. Contractor is to assure orderly review during progress of work and to assure systematic discussion of problems and will conduct all project meetings throughout the construction period. These will include:
 - 1. Weekly progress review meeting which will include Owner's Representative, and Superintendent, and any necessary Subcontractors.
 - 2. First of Month meetings which will include Architect, responsible sub-consultants for respective agenda items Superintendent, and Owner's Representative. At this meeting the request for payment shall be submitted for approval. Also, at this meeting the Contractor shall show current as-built drawings for approval prior to the pay period payment.
 - Β. Owner's Representative, Architect and consultants, project inspectors, and testing personnel will attend as needed.
 - C. **Related Sections:**
 - 1. Section 01 31 10 Scheduling
 - 2. Section 01 34 00 Shop Drawings, Product Data, and Samples
 - 3. Section 01 70 00 Contract Close-out Procedures
 - 4. Individual Specification Sections
 - D. Contractor's discussions with subcontractors and materials suppliers are Contractor's responsibility and normally are not part of project meetings content.

1.02 QUALITY ASSURANCE

Α. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit Contractor to solutions agreed upon in project meetings.

SUBMITTALS 1.03

- Α. Agenda Items: To the maximum extent practicable, advise Owner's Representative at least 24 hours in advance of project meetings regarding items to be on agenda.
- Β. Contractor shall compile minutes of each project meeting, furnishing copies to Owner's Representative and Architect within seven days of each meeting.

PART 2PRODUCTS (not used)

PAGE 2 OF 4

PART 3EXECUTION

3.01 MEETING SCHEDULE

- A. Except as noted below for Preconstruction meeting, project meetings will be held weekly.
- B. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.02 MEETING LOCATION

A. Owner's Representative will establish meeting location.

3.03 PRECONSTRUCTION MEETING

- A. Preconstruction Meeting will be scheduled to be held within 15 working days after Owner's Representative has issued the Notice to Proceed.
 - 1. In addition to Contractor, representatives of sitework, mechanical, electrical and other major subcontractors shall attend.
 - 2. Contractor shall notify other interested parties and request their attendance.
 - 3. Preconstruction meeting will be held in the Owner's Representative's office.
- B. Minimum agenda: Data shall be distributed and discussed on at least the following items:
 - 1. Organizational arrangement of Contractor's forces and personnel, those of subcontractors, materials suppliers, Architect and consultants.
 - 2. Channels and procedures for communication.
 - 3. Construction Schedule, including sequence of critical work. Review materials that might require long lead times, etc.
 - 4. Contract Documents, including distribution of required copies of original documents and revisions.
 - 5. Processing of shop drawings and other data submitted to Owner's Representative for review.
 - 6. Processing of Bulletins, field decisions, and change orders.
 - 7. Rules and regulations governing performance of Work.
 - 8. Procedures for safety and first aid, security, quality control, housekeeping, and related matters.

Processing of payment requests.

10. Preliminary discussions of future close-out procedures.

3.04 PROJECT MEETINGS

9.

- A. Attendance:
 - 1. As much as possible, assign the same person or persons to represent the Contractor at project meetings throughout progress of Work.
 - 2. Subcontractor, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.
- B. Minimum Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observation, problems and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Other business relating to Work.

3.05 CONTRACTOR'S MEETINGS

- PAGE 4 OF 4
- A. Conduct meetings with his own forces, subcontractors and suppliers as is required in individual specifications sections.
- B. Notify Owner's Representative in writing of any impending meetings for which the Owner's Representative's input is needed.
- C. Provide written notice a minimum of two weeks prior to meeting date and include meeting topic, agenda, location, time and list of expected attendees.
- D. Take meeting minutes and provide copies to Owner's Representative within 3 calendar days after meeting.

3.06 CLOSE-OUT MEETINGS

- A. Review Section 01 70 00 regarding Contract Close-out Procedures. Approximately two months prior to Substantial Completion, weekly Project Meetings will include discussion of close-out activities.
- B. Contractor is responsible to invite subcontractors as necessary to review related close-out work.

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SECTION 01 25 00

DEFINITIONS AND EXPLANATIONS

PART 1 GENERAL

1.01 DESCRIPTION

A. Explanation:

This section of the General Requirements defines certain terms used in the specifications and explains the language, format, and certain conventions used in the Project Manual and associated Contract Documents.

B. Related Documents:

Other contract documents directly related to and in some way modified or governed by the General Requirements Division include, but are not necessarily limited to, the following:

- 1. General Provisions
- 2. Supplementary Conditions
- 3. Technical Specifications Sections
- C. Limitations of Scope:

The definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the Work to the extent such definitions or explanations are not stated more explicitly in other parts of the Contract Documents.

1.02 DEFINITIONS

A. General:

A substantial amount of the specification language constitutes specific definitions for terms found in the other Contract Documents, including the Drawings which must be recognized as diagrammatic and quantitative in nature and not completely descriptive of the requirements indicated. Certain terms used repetitiously in the Contract Documents are defined generally as follows:

1. Contract Documents:

The Contract Documents consist of the Owner-Contractor Agreement, the Conditions (Provisions) of the Contract (General, Supplementary, & other Conditions), the Drawings, the Specifications and all Addenda issued prior to and all Modifications issued after execution of the Contract.

LA BOI	OUGH DEFINITIONS AND EXPLANATION	Š
s	PAGE 2 OF	6
2.	Project Manual:	
	The Project Manual is a bound volume or volumes, containing the Bidding Requirements and the Contract Documents, (except Drawings, Addenda, and Change Orders).	
3.	General Requirement:	
	The Provisions or Requirements of Division 1 sections and the General Requirements apply to the entire Work of the Contract, and where so indicated, to other elements of Work which are included in the project.	
4.	Work (capitalized, noun):	
	The Work comprises the completed construction required by the Contract Documents and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.	
5.	work (uncapitalized, verb or noun):	
	Refers to effort or accomplishment.	
6.	Indicated:	
	A cross reference to details, notes, or schedules on the drawings, other paragraphs or schedules in the specifications, and similar means of recording requirements in the Contract Documents. Where terms such as "shown", "noted", "scheduled", or "specified" are used in lieu of "indicated", it is for the purpose of helping the reader locate the reference, and no limitation of location is intended except as specifically noted.	r
7.	Directed, Requested, Authorized, Selected, Approved:	
	Unless otherwise explained, shall imply: "Directed by the Owner's RepresentativeAuthorized by the Owner's Representative", etc. However, no such implied meaning shall be interpreted as to extend the responsibility of the Owner's Representative into the field of responsibility of the Contractor under the Contract.	
8.	Refer:	
	Used to indicate that the subject is defined or specified in further detail at another location in the Contract Documents, or elsewhere as indicated. It shall not be interpreted to require the Contractor to procure, subcontract, or purchase the subject work in any specific manner.	

9. Approve:

Where used in conjunction with the response of the Owner's Representative (Contracting Agency) to submittals, requests, applications, inquiries, reports, and claims by the contractor, the meaning shall be held to the limitations of the responsibilities and

duties of the Owner's Representative. In no case shall it be interpreted as a release of the Contractor from responsibility to fulfill the requirements of the Contract Documents.

10. Project Site, Jobsite:

The location of and the space available and assigned to the Contractor for the performance of the Work. The extent of the Project Site is shown in the Drawings and may or may not correspond with the legal description of the land upon which the project is to be built.

11. Shall/Must/Will:

"Shall" is used generally to indicate a direct indicative requirement. Where encountered, "must" shall be interpreted to mean the same as "shall" and neither is to be interpreted to require more or less stringent compliance than the other.

"Will", where encountered in relation to acts or responsibilities of the Contractor, shall be accorded the same meaning as "shall".

12. Furnish:

Used to mean the procurement, delivery to the project site, unloaded, and ready for unpacking, assembly, erection, or installation, as applicable in each instance.

13. Install:

Used to describe operations at the project site including unpacking, assembly, erection, installation, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations, as applicable in each instance.

14. Provide:

Means Furnish and Install, complete and ready for the intended use, as applicable in each instance.

15. Installer:

The entity (person or firm) engaged by the Contractor, his subcontractor, or subsubcontractor for the performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a general requirement and understanding that such entities (installers) shall be expert in the operations they are engaged to perform.

16. Shop Drawings:

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All drawings, diagrams, illustrations, brochures, schedules, and other data which are prepared by the Contractor, his subcontractors, suppliers, or the manufacturers of the products, which illustrate how specific products, assemblies, or systems are fabricated or installed into the Work.

17. Architect, Architect/Engineer:

Generally used interchangeably to denote the professional consultant retained by the Owner to design the project and prepare the Contract Documents; but also for consultation during administration of the Contract, interpretation of Contract Documents, review and evaluation of materials and methods, and general observation of the progress of the Work. The Architect shall provide construction administration and will be the primary contact for the contractor.

18. Owner's Representative:

The designated representative of the Owner during the construction period to administer the Contract, interpret Contract Documents, review and evaluate materials and methods, and approval on construction administration decisions.

1.03 EXPLANATION

A. General:

This series of explanations is provided to assist the user of these specifications and associated Contract Documents to more readily understand the format, language, implied requirements and similar conventions of the content. None of these explanations shall be interpreted to modify the substance of the specified requirements.

B. Specification Production:

Portions of these specifications have been produced by editing master specifications and may contain minor inconsistencies. Such deviations are a normal result of this production technique, and no other meaning shall be implied or permitted.

C. Format:

The format of principal portions of these specifications can be generally described as follows, although other portions may not fully comply and no particular significance shall be attached to such compliance or non-compliance:

- 1. For convenience, the basic unit of specification text is a "Section", each unit of which is named and numbered. Sections are organized into related families of sections termed "Divisions", which are recognized as the present industry consensus on uniform organization and sequencing of construction specifications.
- 2. The section title is not intended to limit the meaning or content of the section, nor to be fully descriptive of the requirements specified therein, nor to be an integral part of the text. The Section identification is contained in the footer at the bottom of the page.

1.

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Page	Numberina:
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- Pages are numbered independently and sequentially within each section. A new sequence of numbers begins with the beginning of each new Section and is located in the right-hand side of the footer on each page.
- E. The Three-Part Section:

Generally, each section of the specification has been subdivided into three (3) "parts" for uniformity and convenience. They are:

PART 1 GENERAL

PART 2 PRODUCTS

PART 3 EXECUTION

In the event additional parts are required for tables, schedules, etc. they will be added in the form of:

PART 4 APPENDIX

These parts do not limit the meaning of, and are not an integral part of, the text which specifies requirements. In some instances, one or the other of these parts may not be used in which case it will be so noted as "not used."

F. Language:

Direct imperative language is used generally throughout the specifications, and requirements so expressed are the responsibility of the Contractor, even though the work specified actually may be accomplished by specialty subcontractors hired, retained, or otherwise engaged by the Contractor. Any references to third parties in this regard, shall not be interpreted in any way as to relieve the Contractor of any of his responsibilities under the contractor.

G. Specification Types:

The techniques or types of specification used to record the requirements varies throughout the text, and may include types commonly recognized as "prescriptive," "generic descriptive," "compliance with standards (reference)," "performance," "open," "open multi-product," "closed single product," "proprietary," or a combination of these.

H. Trades, Names:

The use of trade titles such as "carpentry," and degrees of expertise such as "journeyman (men)," implies neither that the work is required to be performed by that specific trade, nor that the level of expertise indicated is recognized as peculiar to membership or non-membership in

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any trade or industry association or organization, nor that the specified requirements apply exclusively to work by tradesmen of that corresponding generic name.

PART 2PRODUCTS (not used)

PART 3EXECUTION (not used)

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SECTION 01 31 00

SCHEDULING

PART 1 GENERAL

- 1.01 DESCRIPTION
 - A. To assure adequate planning and execution of the Work so that the Work is completed prior to the completion date stipulated in the Contract, and to assist the Owner's Representative in appraising the reasonableness of the proposed schedule and in evaluating progress of the Work, prepare a project schedule using the Critical Path Method.
 - B. Requirements for progress schedule: General Conditions.
 - C. Construction period: Form of Agreement
 - D. Definitions:
 - 1. "Day", as used throughout the Contract unless otherwise stated, means "calendar day".

1.02 SECTION INCLUDES

- A. References
- B. Quality Assurance
- C. Format
- D. Schedules
- E. RFI's
- F. Review and evaluation
- G. Updating Schedules
- H. Distribution

1.03 RELATED SECTIONS

- A. General Conditions
- B. Supplementary Conditions
- C. Section 01 02 70 Application for Payment Procedures
- D. Section 01 20 00 Project Meetings
- E. Section 01 34 00 Shop Drawings, Project Data, and Samples

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F. Section 01 37 00 Schedule of Values

1.04 REFERENCES

- A. "The Use of CPM in Construction A Manual for General Contractors and the Construction Industry", The Associated General Contractors of America (AGC), Washington, D.C., 1976 edition.
- B. "CPM in Construction Management Project Management with CPM", James O'Brien, McGraw-Hill Book Company, New York, NY 1984, third edition.

1.05 QUALITY ASSURANCE

A. A statement of CPM capability shall be submitted in writing prior to the award of the contract and will verify that either the contractor's organization has "in-house capability" qualified to use the Microsoft Project or that the contractor employs a consultant (firm) which is so qualified.

1.06 FORMAT

- A. Listing: Reading from left to right, in ascending order for each activity. Identify each activity with the applicable Specification section number.
- B. Diagram Sheet Size: Adequate for clear reading.
- C. Scale and Spacing: To allow for notations and revisions.

1.07 SCHEDULES

- A. Prepare the Critical Path Schedule, under concepts and methods outlined in the references list in Article 1.04 above. Show information in such detail that duration times of activities will range normally from one to 15 calendar days.
- B. Illustrate complete sequence of construction by activity, identifying work of separate areas. Provide dates for submittals, including those for Owner furnished items, and return of submittals; dates for procurement and delivery of products; and dates for installation of provision for testing. Provide legend for symbols and abbreviations used.
- C. Actual start date
 - 1. Actual finish date
 - 2. Latest start date
 - 3. Latest finish date
 - 4. Total and free float
 - 5. Monetary value of activity, keyed to Schedule of Values
 - 6. Percentage of activity completed

7.

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Responsibility

- D. Analysis Program Microsoft Project: Capable of compiling monetary value of completed and partially completed activities, of accepting revised completion dates, and recomputation of all dates and float.
- E. Coordinate contents with Schedule of Values in Section 01 37 00.

1.08 RFIs

- A. Definition:
 - 1. Request for additional information from Owner, Architect, or Contractor
- B. General: Request for Information Procedure:
 - 1. Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI to the Owner's representative.
 - 2. Owner will determine necessity of request and forward to the Architect, if required.
 - 3. Owner/Architect/Engineer will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 - 4. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- C. 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. Subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.

K+A designstudios 10. Field dimensions and conditions, as appropriate.	PAGE 4 OF 6	
10. Field dimensions and conditions, as appropriate.		
11. Contractor's suggested resolution.		
12. Contractor's signature.		
 Attachments: Include sketches, descriptions, measurements, photos Shop Drawings, coordination drawings, and other information neces describe items needing interpretation. 	s, Product Data, ssary to fully	
a. Include dimensions, thicknesses, structural grid references, affected materials, assemblies, and attachments on attache	and details of ed sketches.	
D. RFI Forms: Use form supplied by Owner		
1. Attachments shall be electronic files in PDF format.		
E. Architect's Action: Architect will review RFI, determine action required, and respond business days for Architect's response for each RFI. RFIs received by Architect after will be considered as received the following working day.		
1. The following Contractor-generated RFIs will be returned without ac	tion/ignored:	
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 Documents.	he Contract	
e. Requests for adjustments in the Contract Time or the Contr	act Sum.	
f. Requests for interpretation of Architect's actions on submitte	als.	
g. Incomplete, or inaccurately prepared RFIs.		
 Architect's action may include a request for additional information, in Architect's time for response will date from time of receipt by Archite information. 	n which case ect of additional	
 If Contractor believes the RFI response warrants change in the Con Contract Sum, notify Owner's representative in writing within 10 day RFI response. 	tract Time or the /s of receipt of the	

- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by number. Submit log at each construction meeting. Include the following:
 - 1. Project name.

K+A designstudios PAGE 5 OF 6 Name and address of Contractor. 2. 3. Name and address of Architect. 4. RFI number including RFIs that were returned without action or withdrawn. 5. RFI description. 6. Date the RFI was submitted. 7. Date response was received. 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate. 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate. G. On receipt of Owner's action, update the RFI log and immediately distribute the response to affected parties. Review response and notify Owner's representative within 2 days if Contractor disagrees with response. 1.09 **REVIEW AND EVALUATION** Α. Participate in joint review and evaluation of schedule with Owner's Representative at each submittal. Β. Evaluate project status to determine work behind schedule and work ahead of schedule. C. After review, revise as necessary as result of review, and resubmit within 10 days. UPDATING SCHEDULES 1.10 Maintain schedules to record actual start and finish dates of completed activities. Α. Indicate progress of each activity to date of revision, with projected completion date of each Β. activity. Update diagrams to graphically depict current status of Work. C. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes. D. Indicate changes required to maintain Date of Substantial Completion. E. Submit sorts required to support recommended changes. F. Provide narrative report to define problem area, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect.

1.11 DISTRIBUTION

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- A. Following joint review, distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect, and Owner's Representative.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown on Schedules.

PART 2PRODUCTS (not used)

PART 3EXECUTION (not used)

PAGE 1 OF 6

SECTION 01 34 00 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Procedures for submittals.
- B. Related Work Described Elsewhere:
 - 1. General Conditions:
 - 2. Scheduling: Section 01 31 10
 - 3. Quality Control: Section 01 40 00
 - 4. Product Options and Substitutions: Section 01 63 00
 - 5. Record Documents: Section 01 72 00
 - 6. Operation and Maintenance Data: Section 01 73 00

1.02 SHOP DRAWINGS

- A. Present in a clear and thorough manner. Title each drawing with Project name and number; identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.
- B. Identify field dimensions; show relation to adjacent or critical features or Work or products.
- C. Sheet Size:
 - 1. Minimum: 8 1/2 x 11 in.
 - 2. Maximum: 30 x 42 in.
 - 3. In between: Modules of approximately 8 1/2 x 11 in.
- D. Scale and measurements: Make shop drawing accurately to a scale large enough to show pertinent parts of item and method of connection to Work.
- E. Shop drawings include fabrication, erection and setting drawings, schedule drawings, manufacturer's scale drawings, wiring and control diagrams, cuts or entire catalogs, pamphlets, descriptive literature, performance and test data.

- F. Check drawings and schedules, coordinate them with work of trades involved before submission and indicate their approval.
- G. Identify details by reference to sheet and detail, schedule or room numbers shown on Drawings.

1.03 PRODUCT DATA

- A. Submit product data when required by individual Specification Section.
 - 1. Products which are specified in individual Specification Sections or on Drawings by manufacturer's name and complete product number do not require submittal or product data.
 - 2. Supply products specified. Indicate on Submittal Schedule manufacturer's name and complete product, number of product to be supplied, and reference Specification Section and Article number and Drawings and detail number.
- B. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
- C. Modify manufacturers' standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information not applicable.

1.04 SAMPLES

- A. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.

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3.	Email Transm characteristics	ittal: Provide PDF transmittal. Include digital image file illustrating Sample s, and identification information for record.
4.	Web-Based P based Project identify submi	Project Software: Prepare submittals in PDF form, and upload to web- s software website. Enter required data in web-based software site to fully ittal.
5.	Paper Transmindicated.	nittal: Include paper transmittal including complete submittal information
6.	Disposition: N control compa used to deterr	laintain sets of approved Samples at Project site, available for quality- arisons throughout the course of construction activity. Sample sets may be mine final acceptance of construction associated with each set.
	a. Samp Speci time c	ples that may be incorporated into the Work are indicated in individual fication Sections. Such Samples must be in an undamaged condition at of use.
	b. Samp prope	eles not incorporated into the Work, or otherwise designated as Owner's erty, are the property of Contractor.
7.	Samples for In sections of un	nitial Selection: Submit manufacturer's color charts consisting of units or its showing the full range of colors, textures, and patterns available.
	a. Numb patter manu select	per of Samples: Submit Two full set(s) of available choices where color, n, texture, or similar characteristics are required to be selected from facturer's product line. Architect will return one submittal with options ted.
8.	Samples for Verification: Submit full-size units or Samples of size indicated, preparer 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 for the following: partial sections of manufactured or fabricated components; small cuts containers of materials; complete units of repetitively used materials; swatches show color, texture, and pattern; color range sets; and components used for independent testing and inspection.	
	a. Numb Samp Samp	per of Samples: Submit two sets of Samples. Architect will retain one ole set; remainder will be returned. Mark up and retain one returned ole set as a project record Sample.
	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.
1.05 MANUFACTURER'S INSTRUCTIONS

A. Manufacturer's instructions for storage, preparation, assembly, installation, start-up, adjusting, balancing, and finishing.

1.06 CERTIFICATES OF COMPLIANCE

A. Execute certificates of compliance for specified materials in three copies. Sign certificates by an authorized official of manufacturing company, and list name and address of Contractor, Project name and location, and quantity and date of shipment. List name and address of testing laboratory and date of tests on copies of lab test reports submitted with certificates.

1.07 CONTRACTOR REVIEW

- A. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirement of Contract Documents.
- B. Coordinate submittals with requirements of Work and of Contract Documents.
- C. Apply Contractor's review stamp, signed or initialed certifying to review, verification of products, field dimensions and field construction criteria, and coordination of information with requirements of Work and Contract Documents, for each sheet of shop drawings, manufacturer's installation instructions and product data, and label each sample to certify compliance with requirements of Contract Documents. Notify in writing at time of submittal, of any deviations from requirements of Contract Documents, with brief explanation describing deviation.
- D. Do not fabricate products or begin work which requires submittals until return of submittal with acceptance.
- E. It is the Contractor's responsibility to coordinate and verify field conditions, with approved shop drawings, prior to construction, in areas requiring shop drawings.

1.08 SUBMITTAL REQUIREMENTS

- A. Submittal Schedule: Within thirty days from receipt of Notice to Proceed, submit two copies of schedule of submittals requiring review to Owner's Representative.
 - 1. Submittal of preliminary schedule shall occur prior to review and payment of any pay requests.
 - 2. Participate in review of preliminary and complete schedule jointly with Owner's Representative.
 - 3. Submit updated schedules with each Application for Payment.
- B. Transmit submittals in accordance with approved progress schedule and in such sequence to avoid delay in the Work or work of other contracts

K+A designstudios PAGE 5 OF 6 Transmit far enough in advance of scheduled dates for installation to provide time 1. required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery For shop drawing submittal, schedule shall provide for maximum of 10 shop drawings 2. per calendar week to be submitted for review for each of the mechanical, electrical, structural and architectural disciplines. C. Delivery of Submittals: 1. Email: Prepare submittals as PDF package, and transmit to Owner using Owner's submittal website. Include PDF transmittal form. Include information in subject line as requested by Architect. a. Architect, through the Owner, will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file. 2. Paper/Samples: Prepare submittals in paper form, and deliver to Architect. D. Transmit submittals in groups containing all information required for complete review 1. Partial, incomplete submittals will be rejected. E. Provide 8 x 4 in. blank space on each submittal for Contractor's and Owner's stamp. F. Coordinate submittals into logical grouping to facilitate interrelation of the several items: 1. Finishes which involve selection of colors, textures, or patterns 2. Associated items which require correlation for efficient function or for installation. G. PDF files of shop drawings are acceptable. Η. Submit number of copies of product data and manufacturer's instructions Contractor requires, plus four copies which will be retained by Owner's Representative (two copies) and his consultants (two copies). I. Submit number of samples specified in individual Specifications Sections. J. Submit under accepted form of transmittal letter. Identify Project by title and number. Identify Work and product by Specifications section and Article number. K. 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 business 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 business days for review of each resubmittal.

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		4.	Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
		5.	Bidder Design Review: Bidder Design submittals shall be reviewed and forwarded to the AHJ for review within the indicated time frame. AHJ review, and subsequent re- submissions required are not included in the indicated time frame and the contractor should allow ample time for reviews / re-submissions.
		6.	Incomplete submittal packages, submittals that are not provided as specified, may require longer review times.
	L.	Maintain submittal log showing status of submittals, make available for Owner's Representative's review upon request.	
1.09	RESUE	RESUBMITTALS	
	A.	Make	resubmittals under procedures specified for initial submittals; identify changes made since

1.10 DISTRIBUTION

A. Duplicate and distribute reproductions of shop drawings, copies of product data, and samples, which bear stamp of approval, to job site file, Record Documents file, Owner's Representative (2 copies), subcontractors, suppliers, and other entities requiring information.

PART 2PRODUCTS (not used)

previous submittal.

PART 3EXECUTION (not used)

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SECTION 01 37 00

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Breakdown of Contract Sum showing values allocated to each of various parts of Work, as specified here and in other provisions of the Contract Documents.
 - 2. Schedule of values shall be compatible with "continuation sheet" accompanying applications for payment.
- B. Related Work Described Elsewhere:
 - 1. General Conditions:
 - 2. Supplementary Conditions
 - 3. Sections in Division 1 of this Specification.

1.02 QUALITY ASSURANCE

- A. Use required means to assure arithmetical accuracy of sums described.
- B. When required by Owner's Representative, provide copies of subcontractors or other acceptable data substantiating sums described.

1.03 SUBMITTALS

- A. Submit to Owner's Representative a Schedule of Values for Contractor's Work and subcontracted work in each applicable Section of Specifications, Division 2 through 33 inclusive, within ten days after Notice to Proceed.
- B. Upon Owner's Representative's request, support values with data substantiating correctness.
- C. Schedule of Values, unless objected to by Owner's Representative, shall be used only as basis for Contractor's Applications for Payment.
- D. Meet with Owner's Representative's and determine additional information, if any, required to be submitted.
- E. Secure the Owner Representative's approval of the schedule of values prior to submitting first application for payment.

1.04 FORM AND CONTENT OF SCHEDULE OF VALUES

PAGE 2 OF 3

- A. Type schedule on 8 1/2 x 11 in. white paper, Contractor's standard forms and automated printout will be considered for acceptance by Owner's Representative upon Contractor's request. Include emailing to Owner and Architect file saved to MS Excel format. Identify schedule with:
 - 1. Project title and location.
 - 2. Name and Address of Contractor.
 - 3. Date of Submission
- B. List installed value of component parts of Work in sufficient detail to serve as basis for computing values for progress payments during construction.
- C. Follow Table of Contents as format for listing component item:
 - 1. Identify each line item with number and title of respective Section of Specifications.
- D. Under each major item list sub-values of major products or operations.
 - 1. Each line item shall include directly proportional amount of Contractor's overhead and profit.
 - 2. For items on which progress payments will be requested for stored materials, breakdown values into:
 - a. Cost of materials, delivered and unloaded, with taxes paid.
 - b. Total installed value.
- E. Sum of values listed in schedule shall equal total Contract Sum.

1.05 SUB-SCHEDULE OF UNIT MATERIAL VALUES

- A. Submit sub-schedule of unit costs and quantities for products on which progress payments will be requested for stored products.
- B. Form of submittal shall parallel Schedule of Values, with each item identified same as line item in Schedule of Values.
- C. Unit quantity for bulk materials shall include allowance for normal waste.
- D. Break unit values for material down into:
 - 1. Cost of material, delivered and unloaded at Site, with taxes paid.
 - 2. Installation costs, including Contractor's overhead and profit.
- E. Installed unit value multiplied by quantity listed shall equal cost of item in Schedule of Values.

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- F. Materials incorrectly stored at the jobsite are subject to damage and may not be included in progress payments as determined by the Owner's Representative.
- G. The contract sum identified on the schedule of values as "Final" shall be based on the contract award and in an amount as found in the general conditions.

PART 2PRODUCTS (not used)

PART 3EXECUTION (not used)

SECTION 01 40 00

PAGE 1 OF 2

QUALITY CONTROL

PART 1 GENERAL

- 1.01 DESCRIPTION
 - A. All material and workmanship shall be subject to inspection, examination, and test by the Owner's Representative at any and all times during manufacture and/or construction and at any and all places where such manufacture and/or construction are carried on. The Owner's Representative shall have the right to reject defective material and workmanship or require its correction. Rejected workmanship shall be satisfactorily corrected and rejected material shall be satisfactorily replaced with proper material without charge therefor, and the Contractor shall promptly segregate and remove rejected material from the premises. If the Contractor fails to proceed at once with replacement of rejected material and/or correction of defective workmanship, the Owner's Representative may, by contract or otherwise, replace such material and/or correct such workmanship and charge the cost thereof to the Contractor, or may terminate the right of the Contractor to proceed as provided in the General Conditions.
 - B. The Contractor shall call for, coordinate and support inspections and tests required by the Contract Documents. The Owner shall pay all costs for special inspections and tests, required by the Contract Documents with the Contractor paying for coordination of said tests. The presence of, or absence from, the Contract work site of any Owner's Representative shall not relieve the Contractor of his responsibilities for providing of inspection or testing requirements of the Contract.
 - C. Should it be considered necessary or advisable by the Owner's Representative, at any time before final acceptance of the entire work, to make an examination of work already completed by removing or tearing out, the Contractor shall promptly on request furnish all necessary facilities, labor, and materials. If such work is found to be defective or nonconforming in any material respect, due to the fault of the Contractor or his Subcontractors, the Contractor shall defray all the expenses of such examinations and of satisfactory reconstruction. However, if such work is found to meet the requirements of the Contract, the actual direct cost of labor and material necessarily involved in the examination and replacement plus ten percent (10%) shall be allowed the Contractor and, in addition, if completion of the work has been delayed thereby, he shall be granted a suitable extension of time based on the additional work involved.
 - D. Inspection of material and finished articles at the place of production, manufacture, or shipment shall be final except as regards latent defects, departures from specific requirements of the Contract, damage or loss in transit, and fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials and workmanship for final acceptance as a whole or in part shall be made at the site. Nothing contained in this paragraph shall in any way restrict the Contracting Agency's rights under any warranty or guarantee.
 - E. Manufactured articles, materials and equipment shall be applied, installed, connected, erected, cleaned, and conditioned as per manufacturer's printed directions, unless specified to contrary. The Contractor shall provide at least one set of all manufacturer's installation directions, on the jobsite at all times for inspection information.

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SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Temporary utilities such as heat, water, electricity, and land line telephone.
 - 2. Computer with high speed internet access and fax machine.
 - 3. Field offices for the Contractor's personnel, Field offices and utilities for Owner's field office.
 - 4. Sanitary facilities.
 - 5. Enclosures such as tarpaulins, barricades, and canopies.
 - 6. Temporary security fencing.
 - 7. Project Sign.
 - 8. Site and interior lighting.
 - 9. Interior ventilation.
 - 10. Dust control.
 - 11. Traffic control.
 - 12. Security protection provisions.
 - 13. Access barriers.
 - 14. Removal of temporary facilities and controls.
- B. Related Work Described Elsewhere:
 - 1. General Conditions
 - 2. Supplementary Conditions
 - 3. Summary of Work Section 01 01 00
 - 4. Construction Cleaning Section 01 56 90
 - 5. Storage and Protection Section 01 62 00

6. Contract Close-out Procedures Section 01 70 00

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- 7. Final Cleaning Section 01 71 00
- 8. Cast-In-Place Concrete Section 03 30 00

1.02 REQUIREMENTS NOT INCLUDED

- A. Except that equipment furnished by subcontractors shall comply with requirements of pertinent safety regulations, such equipment normally furnished by the individual trades in execution of their own portions of the work are not part of this Section.
- B. Permanent installation and hookup of various utility lines are described in other Sections.
 - 1. Contractor shall coordinate with Electric Utility for temporary power.
 - 2. Telephone: Contractor to provide phone for construction.
- C. Nothing in this Section is intended to limit types and amounts of temporary work required, and no omission from this Section will be recognized as indication by Owner's Representative such temporary activity or facility is not required for successful completion of Work and compliance with requirements of Contract Documents.

1.03 QUALITY ASSURANCE

- A. In addition to compliance with governing regulations and rules, and recommendations of utility companies, comply with specific requirements indicated in these specifications and with applicable local codes and industry standards for construction work.
- B. Comply with provision of Section 01 61 00 Transportation and Handling.
- C. Temporary connections shall be made in an approved manner meeting all applicable codes. Caution shall be taken so systems are not overloaded. Contractor shall take special precautions to keep his temporary connections and lines from being damaged. Temporary connections shall be disconnected and removed prior to completion of Project and returned to original conditions.

1.04 JOB CONDITIONS

- A. General:
 - 1. Establish and initiate use of each temporary facility at time first reasonably required for proper performance of Work.
 - 2. Terminate use and remove facilities at earliest reasonable time, when no longer needed or when permanent facilities have, with authorized use, replaced need.
- B. Conditions of Use:

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- 1. Install, operate, maintain, and protect temporary facilities in safe, non-hazardous, sanitary, manner and location, protective of persons and property, and free of deleterious effects.
- C. Pay costs for such general services and temporary facilities, except as otherwise specified, until final acceptance with Work unless Owner's Representative makes arrangements for use of complete portions of Work after Substantial Completion in accordance with provisions of General Conditions.

PART 2PRODUCTS

- 2.01 ELECTRICITY AND LIGHTING
 - A. The Contractor shall provide the following:
 - 1. Connect to temporary service and provide all equipment necessary for temporary power and lighting. Verify electrical service is of adequate capacity for all construction tools and equipment without overloading facilities.
 - 2. Provide power distribution as required throughout for construction operations of all trades. Locate power distribution boxes at convenient locations in building. Provide distribution boxes for each voltage supply complete with circuit breakers, disconnect switches, and other electrical devices required to protect power distribution system.
 - 3. Provide a temporary lighting system required to satisfy minimum requirements of work, inspection, safety and security. Supply not less than 2 watts per square foot of floor area for illumination in areas of building where work is being performed, unless higher illumination requirements are specified elsewhere.
 - 4. Temporary interior and exterior lighting during construction is to be maintained by Contractor so that work can be properly and safely performed. Special attention shall be given so that stairs, ladders, openings, barricades and other similar items and spaces are adequately lighted.
 - 5. Conform to applicable provision of governing codes. Maintain temporary wiring in safe manner, utilized to not constitute hazard to persons or property.
 - 6. Permanent electrical power, when in operating condition, may be used for temporary power for construction purposes, provided Contractor assumes full responsibility for entire power system.
 - 7. At completion of construction work remove temporary wiring, lighting and other temporary electrical equipment devices.
 - 8. Contractor shall be responsible for all power and gas utility costs during construction until substantial completion is approved.

2.02 HEATING AND VENTILATION

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- A. Contractor shall provide, at his own expense, sufficient temporary heat for proper installation of work; and to protect all work and materials; and shall keep humidity down to extent required to prevent corrosion, dampness and mildew potentially damaging to materials and finishes. Fuel, equipment, and method of temporary heat shall be reviewed by Owner's Representative for appropriateness. Do not overheat spaces and materials. All such heating, ventilation and services shall be provided and maintained until final acceptance of all work. In addition, provide heat and ventilation prior and during Work operations as specified in Specifications.
- B. Connect temporary heating and ventilating equipment to electric facilities; contractor to pay cost for energy used.
- C. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.
- D. Prior to operation of permanent facilities for temporary purposes, verify installation is approved for operation, and filters are in place. Provide and pay for operation, maintenance and utilities. Use of permanent heating plant shall not relieve Contractor of guarantee responsibilities.
- E. If permanent heating system is used for temporary heat, or ducts used for ventilation, completely clean ducts of dust and dirt and replace disposable type filers on as-needed basis, and install new permanent type filters prior to occupancy by Owner.

2.03 WATER

- A. Contractor shall furnish and install necessary temporary piping to carry on work and upon completion of Work shall remove all temporary piping.
- B. Contractor shall obtain necessary permits.
- C. Furnish drinking water with suitable containers and cups for use of employees. Conveniently locate drinking water dispensers in areas where Work is in progress.
- D. Contractor shall pay for all water brought to the site for construction work or obtained through utility.

2.04 SANITARY FACILITIES

- A. Provide and maintain adequate temporary toilet and hand washing facilities, approved by regulating authorities, throughout construction for all personnel connected with Work.
- B. Locate where directed when work is started and maintain in sanitary condition at all times supplied with adequate amounts of tissue, subject to inspection and approval of Owner's Representative.
- C. Provide separate facilities for male and female personnel when both sexes are working at Project.
- D. As soon as conditions allow, temporary toilets may, upon approval of Owner's Representative, be located outside near building entries.

E. Remove temporary facilities when directed and disinfect premises.

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2.05 STORAGE AND SHOP

- A. Contractor shall provide temporary storage and shop rooms and /or enclosures that may be required at site for safe and proper storage of tools, materials, etc. Locate such facilities only in locations approved by Owner's Representative and so as not to interfere in any way with proper installation and completion of other work.
- B. During progress of Work, materials shall be neatly stacked at such points as Owner's Representative may direct and shall be properly cared for and protected from weather and theft.
- C. Contractor shall store construction material and equipment within boundaries of designated areas. Storage of gasoline or similar fuels shall conform to NFPA regulations and local fire marshal regulations and shall be confined within definite boundaries apart from buildings as approved by authorities having jurisdiction.

2.06 FIELD OFFICES

A. Provide a field office adequate in size and accommodation for Contractor's offices, office supplies and storage, and a separate, secure office for use by Owner's Representative, until Substantial Completion of the Project.

2.07 TELEPHONE SERVICE

- A. Provide and maintain direct line telephone service at Site to each of Contractor's field offices.
- B. Pay all costs for installation, maintenance, normal monthly charges and all Contractor's longdistance charges.
- C. Remove temporary telephone service at completion of work.
- D. Provide functioning facsimile machine, copier, and network connection for contractor's and owner's email in office for duration of project.

2.08 PROJECT IDENTIFICATION

- A. Provide 8 w x 4 h ft. project sign of exterior grade plywood and wood frame construction, painted, 6" min. letters to Architect's design and colors.
- B. List title of project, names of Owner, Architect, and Contractor.
- C. Erect on site at location established by Owner's Representative.
- D. No other signs are allowed without Owner's Representative's permission except those required by law.
- 2.09 UTILITY MARKERS

- A. Provide markers above all new and disturbed existing below grade buried utility lines in accordance with this Article. Identify location of markers and include marker information on Record Documents, specified in Section 01 72 00.
- B. Provide stake at each extremity end of utility with 14 gauge trace wire along side of each utility line. Securely attach trace wire to stake at each end.
- C. Set markers at all locations where the following conditions exist:
 - 1. Above utility lines at exterior walls of building and at entries and exits of lines from above grade installations.
 - 2. At ends and changes of direction of lines.
 - 3. Debatable locations shall be directed by the Owner's Representative.

PART 3EXECUTION

3.01 MAINTENANCE

- A. Maintain temporary facilities and controls as long as needed for safe and proper completion of Work.
- B. Remove such temporary facilities and controls as rapidly as progress of Work will permit, or as directed by Owner's Representative.

3.02 USE OF TEMPORARY FACILITIES

A. Temporary facilities shall be made available for use by workmen and subcontractors employed on Project and Owner's Representative, subject to reasonable direction by Contractor as to their proper and most efficient utilization.

3.03 CONSTRUCTION AIDS

- A. Provide and operate drainage and pumping equipment; maintain excavations and Site free of standing water.
- B. Provide and maintain properly calibrated moisture meter of type acceptable to Owner's Representative.
 - 1. Verify moisture content of concrete and concrete masonry units, wood and wood products, gypsum wallboard and other materials to assure that substrate products are dry and cured to subsequent finish manufacturer's recommendations prior to installation of finish materials.

3.04 ENCLOSURES

A. Security:

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- 1. At earliest possible date, secure building against unauthorized entrance at times personnel area not working.
- 2. Provide temporary, insulation, weather-tight closures of openings in exterior surfaces to provide acceptable work conditions and protection for material; to allow for temporary heating and prevent entry of unauthorized persons. Provide doors with self-closing hardware and locks.
- B. Access Provisions:
 - 1. Provide ramps, stairs, ladders, and similar temporary access elements as reasonably required to perform Work and facilitate inspection during installation.
 - 2. Comply with reasonable requests of governing authorities performing inspections.
 - 3. When permanent stairs are available for access, during construction, cover finished surfaces and maintain free from damage and deterioration through substantial completion.

3.05 PROTECTION OF INSTALLED WORK

- A. Provide temporary protection for installed products in accordance with requirements specified in Section 01 62 00 and as follows. Control traffic in immediate area of installed products to minimize damage.
- B. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.
- C. Prohibit traffic and storage on waterproofed and roofed surfaces, on lawn, on concrete paving, and landscaped areas.
- D. Prohibit and take necessary precautions to prevent oil, gas and other liquids from vehicles and equipment from discharging onto concrete and asphalt concrete pavement.

3.06 POLLUTION CONTROL

- A. Use water sprinkling and other suitable methods to limit dust and dirt rising and scattering in air to lowest practicable level.
 - 1. Do not use water if use may create hazardous or objectionable conditions such as ice, flooding and pollution.
 - 2. Comply with governing regulations pertaining to environmental protection.

3.07 TRAFFIC

A. Conduct operations and removal of debris to ensure minimum interference with adjacent occupied facilities.

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B. Do not close or obstruct completed areas without permission from Owner's Representative. Provide alternate and safe routes around closed or obstructed traffic ways if required.

3.08 SECURITY AND PROTECTION PROVISIONS

- A. Provide temporary security and protection including, but not limited to; fire protection, barricades, warning signs/lights, personnel security program (theft prevention), environmental protection, and similar provision intended to minimize property losses, personal injuries, and claims for damages at Site.
- B. Unauthorized Entry:
 - 1. Maintain provision for closing and locking building during non-working hours.

3.09 REMOVAL

- A. Completely remove temporary materials and equipment when use is no longer required.
- B. Remove temporary underground installations to depth of 2 ft. below finish Site grade.
- C. Clean and repair damage caused by temporary installations or use of temporary facilities. Restore any installed facilities used for temporary services to specified, or original condition.

3.10 CLEANING

- A. Comply with requirement specified in Section 01 56 90.
- B. Maintain the public road and access to the Site in a clean condition. Remove the mud, dirt, rocks, etc. from the tires of vehicles before they exit the Site.

SECTION 01 56 90

CONSTRUCTION CLEANING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Cleaning and disposal of waste materials, debris, and rubbish during construction.
- B. Related Work Described Elsewhere:
 - 1. General Conditions: Division 1
 - 2. Final Cleaning: Section 01 71 00
 - 3. Individual Specification Sections: Specific cleaning for Product or Work.

PART 2 PRODUCTS

- 2.01 EQUIPMENT
 - A. Provide covered containers for deposit of waste materials, debris, and rubbish.

PART 3 EXECUTION

3.01 CLEANING

- A. Maintain areas under Contractor's control free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition. Remove scrap materials, rubbish and trash daily from in and about building. Do not permit scrap materials, rubbish and trash to be scattered on adjacent areas.
- B. Maintain the public road and access to the site in a clean condition. Remove the mud, dirt, rocks, etc. from the tires of vehicles before they exit the Site.
- C. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to closing the space.
- D. Periodically clean interior areas to provide suitable conditions for work.
- E. Broom clean interior areas prior to start of surface finishing and continue cleaning on an asneeded basis.
- F. Control cleaning operations so that dust and other particles will not adhere to wet or newlycoated surfaces.

3.02 DISPOSAL

A. Remove waste material, debris, and rubbish from site periodically and dispose of off-site.

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SECTION 01 60 00

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Products
- B. Related Work Described Elsewhere:
 - 1. Instructions to Bidders:
 - 2. General Conditions: Division 1
 - 3. Quality Control: Section 01 40 00

1.02 PRODUCTS

- A. Products: Means new materials, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.
- B. Provide interchangeable components of the same manufacture, for similar components.
- C. No product or material shall be used as a building material in this project which contains any asbestos.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION (not used)

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SECTION 01 61 00

TRANSPORTATION AND HANDLING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Protection of products scheduled for use in Work.
- B. Related Work Described Elsewhere:
 - 1. General Conditions
 - 2. Additional procedures as specified in other sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Include procedures required to assure full protection of work and materials.

1.03 MANUFACTURERS' RECOMMENDATIONS

A. Except as otherwise approved by the Owner's Representative, determine and comply with manufacturers' recommendations on product handling, storage, and protection.

1.04 PACKAGING, TRANSPORTATION

- A. Require supplier to package products in boxes or crates for protection during shipment, handling, and storage. Protect sensitive products against exposure to elements and moisture, including ocean barging.
- B. Protect sensitive equipment and finishes against impact, abrasion, and other damage. Temperature sensitive products, such as paint, shall be protected from freezing during shipment.
- C. Arrange deliveries of products in accordance with construction progress schedules. Allow time for inspection prior to installation.
- D. Coordinate deliveries to avoid conflict with work; conditions at site; limitations on storage space; availability of personnel and handling equipment; and Owner's use of premises.
- E. Deliver products to job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items from job site, and promptly replace with material meeting specified requirements, at no additional cost to Owner.

- F. Owner's Representative may reject as non-complying such material and products that do not bear identification satisfactory to the Owner's Representative as to manufacturer, grade, quality, and other pertinent information.
- G. Clearly mark partial deliveries of component parts of equipment. Identify equipment and contents to permit easy accumulation of parts and facilitate assembly.
- H. Immediately on delivery inspect shipment to ensure:
 - 1. Product complies with requirement of Contract Documents and reviewed submittals.
 - 2. Quantities are correct.
 - 3. Accessories and installation are correct.
 - 4. Containers and packages are intact and labels are legible.
 - 5. Products are protected and undamaged.

1.05 PRODUCTS

- A. Provide equipment and personnel to handle products, including those provided by Owner, by methods to prevent soiling and damage.
- B. Provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.
- C. Handle product by methods to avoid bending or overstressing. Lift large and heavy components only at designed lift points.

1.06 PROTECTION

- A. Protect finished surfaces, including jambs and soffits of openings used as passageways, through which equipment and materials are handled.
- B. Provide protection for finished floor surfaces in traffic areas prior to allowing equipment or materials to be moved over such surfaces.
- C. Maintain finished surfaces clean, unmarred and suitably protected until accepted by Owner's Representative.

1.07 REPAIRS AND REPLACEMENTS

- A. In event of damage, promptly make replacement and repairs to the approval of and at no additional cost to Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by Owner to justify an extension in Contract Time.

PART 2 PRODUCTS (not used)

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SECTION 01 62 00

STORAGE AND PROTECTION

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Storage and protection of products scheduled for use in Work.

1.02 QUALITY ASSURANCE

A. Include within Contractor's quality assurance program such procedures as are required to assure full protection of Work and materials.

1.03 MANUFACTURERS' RECOMMENDATIONS

A. Except as otherwise approved by the Owner's Representative, determine and comply with manufacturers' recommendations on product handling, storage, and protection.

1.04 STORAGE - GENERAL

- A. Store products, immediately on delivery, in accordance with manufacturer's instruction, with seals and labels intact. Protect until installed.
- B. Arrange storage in manner to provide access for maintenance of stored items and for inspection.

1.05 ENCLOSED STORAGE

- A. Store products, subject to damage by elements, in substantial, weather-tight enclosures.
- B. Maintain temperature and humidity within ranges stated in manufacturer's instruction and/or individual technical specifications section.
- C. Provide humidity control and ventilation for sensitive products as required by manufacturer's instructions and as necessary to protect product.
- D. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.

1.06 EXTERIOR STORAGE

- A. Provide substantial platforms, blocking, or skids to support fabricated products above ground; slope to provide drainage. Protect products from soiling and staining.
- B. For products subject to discoloration or deterioration from exposure to elements, cover with impervious sheet material. Provide ventilation to avoid condensation.

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- C. Store loose granular materials in clean solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
- D. Provide surface drainage to prevent erosion and ponding of water.
- E. Prevent mixing of refuse, chemically injurious materials, and liquids.
- 1.07 MAINTENANCE OF STORAGE
 - A. Periodically inspect stored products on a schedule basis.
 - B. Verify storage facilities comply with manufacturer's product storage requirements.
 - C. Verify manufacturer required environmental conditions are maintained continually.

1.08 MAINTENANCE OF EQUIPMENT STORAGE

- A. For mechanical and electrical equipment in long-term storage, provide manufacturer's service instructions to accompany each item, with notice of enclosed instructions shown on exterior of package.
- B. Service equipment on regularly scheduled basis, maintaining log of services; submit as record document.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION (not used)

PAGE 1 OF 4

SECTION 01 63 00

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Contractor's options in selection of products.
 - 2. Products List
 - 3. Requests for Substitution Form.
- B. Related Work Described Elsewhere:
 - 1. Instructions to Bidders
 - 2. Substitution Request Form
 - 3. General Conditions
 - 4. Summary of Work: Section 01 01 00
 - 5. Reference Standards: Section 01 09 00
 - 6. Shop Drawings, Product Data, and Samples: Section 01 34 00
 - 7. Record Documents: Section 01 72 00
 - 8. Operation and Maintenance Data: Section 01 73 00

1.02 OPTIONS

- A. Products Specified by Reference Standard or by Description Only: Any product meeting those standards.
- B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution a minimum of 10 days prior to Bid for any manufacturer not specifically named. Following Proposal opening, only products of named manufacturers meeting specifications or approved substitutions shall be allowed.
- C. Products Specified by Naming Only One or More Manufacturers with "No Substitution" statement: Products of named manufacturers meeting specifications; no substitution allowed.

1.03 PRODUCTS LIST

A. Within 15 days after date of Notice to Proceed, transmit three copies of list of major products which are proposed for installation, including name of manufacturer.

- B. Tabulate products by Specifications Section number, title and Article number.
- C. For Products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
- D. Owner's Representative will reply in writing within 10 days stating whether there is reasonable objection to listed items. Failure to object to listed items shall not constitute waiver of requirements of Contract Documents.

1.04 LIMITATIONS ON SUBSTITUTIONS

- A. Instructions to Bidder govern terms for submitting request for substitutions under requirements specified in this Section.
- B. Requests for substitutions after Contract Award may be considered only in proven cases of product unavailability through no fault of Contractor.
- C. Substitutions will not be considered when acceptance will require substantial revision of Bidding or Contract Documents.
- D. Do not order or install substitute products without written acceptance.
- E. Two requests for substitution for each product will be considered. When substitution is not accepted, provide specified product.
- F. Owner's Representative and Architect will determine acceptability of substitutions.

1.05 REQUESTS FOR SUBSTITUTIONS

- A. Submit substitution requests using a Substitution Request Form. Substitution requests will not be reviewed without an accompanying fully executed Substitution Request Form.
- B. Submit separate request for each substitution. Document each request with complete data substantiating compliance of proposed substitution with requirements of Contract Documents.

Submit samples, shop drawings from prior jobs, product date, manufacturer's installation instructions, and certified test results attesting to proposed product equivalence.

- C. Identify product by Specification Section and Article numbers. Provide manufacturer's name and address, trade name of product, and model or catalog number. List fabricators and suppliers as appropriate.
- D. Attach product data as specified in Section 01 34 00
- E. List similar project using product, dates of installation, and names with numbers of Owner and Architect.

- F. Give itemized quality and performance comparison between proposed substitution with specified product, listing variations, and reference to Specification Section and Article numbers. Base comparison on tests and criteria specified, and with specified manufacturer's performance criteria when tests and criteria are not otherwise specified.
- G. List availability of maintenance services and replacement materials.
- H. State effect of substitution on construction schedule, and changes required in other work or products.
- I. Forms that are incomplete or incorrectly filled out will be rejected.

1.06 BIDDER REPRESENTATION

- A. Request for substitution constitutes representation that Bidder:
 - 1. Has investigated proposed product and has determined that it meets or exceed the quality level of specified product.
 - 2. Will provide same warranty for substitution as for specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for work to be complete with no additional costs to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner for review or redesign service associated with re-approval by authorities.

1.07 SUBMITTAL PROCEDURES

- A. Submit five copies of the Request for Substitution Form with attachments. Limit each request to one proposed substitution.
- B. Owner's Representative and Architect will review Contractor's request for substitutions with reasonable promptness.
- C. During bidding period, Owner will record acceptable substitutions in Addenda.
- D. For accepted products, submit shop drawings, product data, and samples under provisions of Section 01 34 00.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION (not used)

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SUBSTITUTION REQUEST FORM

TO: KENAI PENINSULA BOROUGH ATTN: PURCHASING AND CONTRACTING DEPT. 47140 EAST POPPY LANE SOLDOTNA, AK 99669 (907) 714-2260 FAX (907) 714-2373

PROJECT: NIKISKI FIRE STATION NO. 3

SPECIFIED ITEM:

Submitted by:

Section Paragraph Description

The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION:

Attached data includes product description, specifications, drawings, photographs, performance and test date adequate for evaluation of the request; applicable portions of the data area clearly identified.

Attached data also includes description of changes to Contract Documents which proposed substitution will require for its proper installation.

The undersigned states that the following paragraphs, unless modified on attachments, are correct:

- 1. The proposed substitution does not affect dimensions shown on Drawings.
- 2. The undersigned will pay for changes to the building design, including engineering design, detailing and construction costs caused by the requested substitution.
- 3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or specified warranty requirements.
- 4. Maintenance and service parts will be locally available for the proposed substitution.

The undersigned further states that the function, appearance and quality of the Proposed Substitution are equivalent or superior to the Specified Item.

Signature	For use by Design Consultant:
Firm	Accepted Accepted as noted
Address	Not Accepted By:
Date	Date:
Telephone	Remarks:

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SECTION 01 67 00

SYSTEM DEMONTSTRATION

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Procedures for demonstration of equipment operation and instruction of Owner's personnel.
 - 2. Contractor shall be responsible for instruction and training of operating personnel in operation and maintenance of mechanical, electrical, and other systems in building.
- B. Related Work Described Elsewhere:
 - 1. Summary of Work: Section 01 01 00
 - 2. Operation and Maintenance Data: Section 01 73 00
 - 3. Divisions 10, 21, 22, 23, 26, 27 and 28
 - 4. Other Individual Sections: Specific requirements for demonstrating systems and equipment.

1.02 QUALITY ASSURANCE

- A. When specified in individual sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner personnel, and provide written report stating demonstrations and instructions have been completed.
- B. Owner's Representative will provide list of personnel to receive instructions and will coordinate their attendance at agreed upon times.

1.03 SUBMITTALS

- A. Submit preliminary schedule for Owner's Representative's approval, listing times and dates for demonstration of each item of equipment and each system three weeks prior to proposed dates.
- B. Contractor shall submit his training materials and agenda to the Owner's Representative at least 15 days prior to start of formal maintenance training classes. Mutually agreeable dates for receiving training shall be arranged with Owner's Representative. Building system shall be complete when training is given.
- C. Submit reports within one week after completion of demonstrations, that demonstrations and instructions have been satisfactorily completed. Give time and date of each demonstration, hours devoted to demonstration, and list of persons present.

PART 2 PRODUCTS (Not Used)

K+A designstudios PART 3 EXECUTION

PAGE 2 OF 3

3.01 PREPARATION

- A. Verify equipment has been inspected and put into operation in accordance with applicable specification Section; testing, adjusting, and balancing has been performed in accordance with applicable specification Section, and equipment and systems are fully operational.
- B. Have copies of completed operation and maintenance manuals at hand for use in demonstrations and instructions.

3.02 TYPE OF TRAINING

- A. Instruction shall be on the job.
- B. Services of competent contractors or manufacturer engineers and qualified maintenance personnel shall be provided to adequately train designated Owner's employees in operation and maintenance of all mechanical and electrical systems.
- C. Operating and maintenance manuals prepared by Contractor, manufacturers literature of actual equipment installed and copies of approved posted operating instructions shall be used as a basis for training.

3.03 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of final inspection. For equipment requiring seasonal operation, perform instructions for operation and maintenance.
- B. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled times, at equipment location.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

3.04 TIME ALLOCATED FOR INSTRUCTIONS

- A. Training period: Training shall occur within one week after substantial completion. Not less than four hours for each category of major equipment and system except as specifically listed below:
 - 1. HVAC System: Including air handlers, duct work, dampers and related equipment with respective operating controls. 8 hours.
 - 2. Overall Control System: Coordinate respective HVAC and other system controls, show how controls function together and provide integrated overall system control. 8 hours.

- Electrical System: All building services, lighting, communications, public address system, access control, energy management systems, and all other electrical systems. 8 hours.
 Piping and Plumbing Systems: Storm and sanitary drainage systems, and hot and cold water supply systems. 4 hours.
 - 5. Fire protection equipment, intercom system, and other equipment not specifically stated above. 4 hours/each.
- B. Proof of training must be certified in writing by Owner's personnel.

PAGE 1 OF 4

SECTION 01 70 00

CONTRACT CLOSE-OUT PROCEDURES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Admini strative provisions for Substantial Completion and Final Acceptance.
- B. Related Work Described Elsewhere:
 - 1. General Conditions:
 - 2. Summary of Work: Section 01 01 00
 - 3. Applications for Payment: Section 01 02 70
 - 4. Temporary Facilities and Temporary Controls: Section 01 50 00
 - 5. Final Cleaning: Section: 01 71 00
 - 6. Project Record Documents: Section 01 72 00
 - 7. Operations and Maintenance Data: Section 01 73 00
 - 8. Warranties and Bonds: Section 01 74 00
 - 9. Spare Parts and Maintenance Materials: Section 01 75 00
 - 10. Door Hardware: Section 08 70 00
 - 11. Mechanical Sections
 - 12. Electrical Sections

1.02 SUBSTANTIAL COMPLETION

- A. Advise Owner's Representative of pending insurance change-over requirements.
- B. When Contractor considers Work or designated portion of Work is substantially complete, submit written notice with list of items to be completed or corrected.
 - 1. Submit formal written request for Substantial Completion Inspection.
 - 2. Contractor shall submit Certificate of Occupancy issued by local Building Official with the request for Substantial Completion Inspection.
- C. Should Owner Representative's inspection find Work is not substantially complete, he will promptly terminate the inspection, and notify Contractor in writing, listing observed deficiencies.
- D. Contractor shall remedy deficiencies and send a second written notice of substantial completion.
- E. When Owner's Representative finds Work is substantially complete he will prepare a Certificate of Substantial completion in accordance with provisions of General Conditions.

1.03 FINAL COMPLETION

- A. When Contractor considers Work is complete, submit written certification:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been inspected for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.
 - 4. Equipment and systems have been tested, adjusted, and balanced, and are fully operational.
 - 5. Operation of systems has been demonstrated to Owner's Personnel.
 - 6. Work is complete and ready for final inspection.
- B. Should Owner's Representative inspection find Work incomplete, he will promptly notify Contractor in writing listing observed deficiencies.
- C. Contractor shall remedy deficiencies and send a second certification of final completion.
- D. When Owner's Representative finds work is complete, he will consider close-out submittals.

1.04 REINSPECTION FEES

A. Should status of completion of Work require re-inspection by Owner's Representative due to failure of Work to comply with Contractor's claims on initial inspection, Owner will deduct the amount of his expense, including but not necessarily limited to Owner's Representative compensation for re-inspection services from final payment to Contractor.

1.05 CLOSE-OUT SUBMITTALS

- A. Evidence of Compliance with Requirements of Governing Authorities:
 - 1. Certificate of Occupancy
 - 2. Certificates of Inspection required for mechanical and electrical systems.

- B. Project Record Documents: Under provision of Section 01 72 00.
- PAGE 3 OF 4
- C. Operation and Maintenance Data: Under provisions of Section 01 73 00.
- D. Warranties and Bonds: Under provisions of Section 01 74 00.
- E. Spare Parts and Maintenance Materials: Under provisions of Section 01 75 00.
- F. Keys and Keying Schedule: Under provisions of Section 08 70 00.
- G. Evidence of Payment and Release of Liens: In accordance with Conditions of the Contract.
- H. Consent of Surety to Final Payment.
- I. Certificates of Insurance for Products and Completed Operations: In accordance with Supplementary Conditions.
- J. Department of Labor, NOC approved.
- K. Record information shall be produced utilizing AutoCAD 2017 or more current release and provided on PDF digital format on a USB 3.0 or higher thumb drive.

1.06 STATEMENT OF ADJUSTMENT OF ACCOUNTS

- A. Submit final statement reflecting adjustments to Contract Sum indicating:
 - 1. Original Contract Sum
 - 2. Previous Change Orders
 - 3. Changes Under Allowances
 - 4. Changes Under Unit Prices
 - 5. Deductions for Uncorrected Work
 - 6. Deductions for Liquidated Damages
 - 7. Deductions for Re-inspection Fees
 - 8. Other Adjustments to Contract Sum
 - 9. Total Contract Sum as adjusted.
 - 10. Previous Payments
 - 11. Sum Remaining Due
- B. Owner's Representative will issue a final Change Order reflecting approved adjustments to Contract Sum not previously made by change orders.

1.07 APPLICATION FOR FINAL PAYMENT

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A. Submit application for final payment in accordance with provisions of Conditions of the Contract.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION (not used)

END OF SECTION

PAGE 1 OF 2

SECTION 01 71 00

FINAL CLEANING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Final Cleaning of Project.
- B. Related Work Described Elsewhere:
 - 1. General Conditions
 - 2. Construction Cleaning: Section 01 56 90
 - 3. Contract Close-out Procedures: Section 01 70 00
 - 4. Individual Specifications Section: Specific cleaning of product or work.

1.02 CLEANING

A. Execute cleaning prior to inspection for Substantial Completion of the Work.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

- A. Use materials which will not create hazards to health or property, and which will not damage surfaces.
- B. Use only materials and methods recommended by manufacturer of material being cleaned.

PART 3 EXECUTION

3.01 CLEANING

- A. In addition to removal of debris and cleaning specified in other section, clean interior and exterior exposed-to-view surfaces.
- B. Remove temporary protection and labels not required to remain.
- C. Clean finishes free of dust, stains, films, and other foreign substances.
- D. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
- E. Vacuum clean carpeted and similar soft surfaces.

- F. Clean, damp mop, wax, and polish resilient and hard-surface floors as specified.
- G. Clean surfaces of equipment and remove excess lubrication.
- H. Clean plumbing fixtures, food service equipment, and toilet accessories to a sanitary condition.
- I. Clean permanent filters of ventilation equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers and coils when units have been operated without filters during construction.
- J. Clean light fixtures and lamps.
- K. Maintain cleaning until Substantial Completion.
- L. Remove waste, foreign matter, and debris from roofs, gutters, area ways, and drainage systems.
- M. Remove waste, debris, and surplus materials from site. Clean grounds; remove stains, spills, and foreign substances from paved areas and sweep clean. Rake clean other exterior surfaces.
- N. Owner will provide final cleaning of interiors after Substantial Completion, except that items not adequately cleaned prior to Substantial Completion shall be recleaned prior to final inspection. Provide access and coordinate with Owner's personnel at a time agreeable to both parties.
- O. Prior to Substantial Completion, clean all parking lots, aprons, sidewalks and driveways on site to a new state.

END OF SECTION

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SECTION 01 72 00

RECORD DOCUMENTS

PART 1 GENERAL

- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Maintenance of Record Document and samples.
 - 2. Submittal of Record Documents and samples.
 - B. Related Work Descried Elsewhere:
 - 1. Grades, Lines and Levels: Section 01 05 20
 - 2. Shop Drawings, Product Data and Samples: Section 01 34 00
 - 3. Contract Close-out Procedures: Section 01 70 00
 - 4. Operation and Maintenance Data: Section 01 73 00
 - 5. Individual Specifications Sections:
 - 6. Manufacturer's certificates and certificates of inspection.
 - C. The Contractor shall maintain on the jobsite one complete set of drawings and specifications on which all items located at jobsite and all changes of material, equipment, or dimensions shall be recorded and kept current on a daily basis and shall be made available to the Owner's Representative at all times. This shall include all work of the Contractor and Subcontractors. Each progress pay request will not be processed until Owner's Representative determines that the Contractor has kept the "As-Built" drawings and specifications as specified.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. In addition to requirements in General Conditions, maintain at the site for Owner's Representative one record copy of:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Change Orders and other modifications to the Contract
 - 5. Reviewed shop drawings, product data, and samples

K+A designstudios PAGE 2 OF 4 Field test records 6. 7. Inspection certificates 8. Manufacturer's certificates Β. Store Record Documents and samples in Field Office apart from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples. Delegate the responsibility for maintenance of Record Documents to one person on the 1. Contractor's staff. C. Label and file Record Documents and samples in accordance with Section number listing in Table of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat. printed letters. Maintain Record Document in a clean, dry and legible condition. Do not use Record D. Documents for construction purposes. E. In the event of loss of recorded data, use means necessary to again secure the data to the Owner's Representative approval. F. Keep Record Documents and samples available for inspection by Owner's Representative. 1.04 RECORDING Record information on a set of blue line opaque drawings, and in a copy of a Project Manual, Α. provided by Owner's Representative. Β. Provide felt tip marking pens, maintaining separate colors for each major system, for recording information. C. Record information concurrently with construction progress. Do not conceal any work until required information is recorded. 1. Make entries within 24 hours after receipt of information that the change has occurred. D. Contract Drawings and Shop Drawing: Legibly mark each item to record actual construction, includina: 1. Measured depths of elements of foundation in relation to finish first floor datum. 2. Measured horizontal and vertical locations of underground utilities and appurtenances. referenced to permanent surfaces improvements.

- a. Locate with actual dimensions to building walls and corners, buried and concealed wiring and piping.
- b. Show end of run, changes in direction, valves and splice boxes.

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			c. Record average depth relating to building datum.				
		3.	Measured locations of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of construction. Show on Record Drawings, the centerline of each run.	١,			
			a. Clearly identify the item by accurate note such as "cast iron drain" "galwater," etc.	v.			
			b. Show, by symbol or note, the vertical location of the item ("under slab," "in ceiling plenum," "exposed," etc.).				
			c. Make all identification sufficiently descriptive that it may be related reliably the Specifications.	to			
		4.	Field changes of dimension and detail.				
		5.	Changes made by Modifications.				
		6.	Details not on original Contract Drawings.				
		7.	References to related shop drawings and Modifications.				
	E.	Specifi	ications: Legibly mark each item to record actual construction, including:				
		1.	Manufacturer, trade name, and catalog number of each product actually installed, particularly optional items and substitute items.				
		2.	Changes made by Addenda and Modifications.				
	F.	Other I require	Documents: Maintain manufacturer's certifications and inspection certifications ed by individual Specifications sections.				
1.05	5 DIGITAL PROJECT MANAGEMENT PROCEDURES						
	A.	Use of provide Archite	f Architect's Digital Data Files: Limited Digital data files of Architect's CAD drawings led by Architect for Contractor's use during construction. Release of CAD drawings ects Discretion and should not be automatically assumed.				
		1.	Digital data files may be used by Contractor in preparing coordination drawings, Sho Drawings, and Project record Drawings.	р			
		2.	Architect makes no representations as to the accuracy or completeness of digital da files as they relate to Contract Drawings.	ıta			

3. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

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 a.
 Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.

 4.
 The following digital data files may be furnished for each appropriate discipline:

 a.
 Floor plans.

 b.
 Reflected ceiling plans.

- B. Web-Based Project Software: Use Owner's web-based Project software site for purposes of transmitting submittals only.
 - 1. Web-based Project software other than the Owner's submittal tracking system, will not be used.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
 - 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.06 SUBMITTALS

- A. At Contract close-out, deliver Record Documents and samples under provisions of Section 01 70 00.
- B. Transmit with cover letter in duplicate, listing:
 - 1. Date
 - 2. Project Title and Number
 - 3. Contractor's name, address and telephone number
 - 4. Number and title of each Record Document.
 - 5. Signature of Contractor or authorized representative.

PART 2 PRODUCTS (not used)

PART 3EXECUTION (not used)

END OF SECTION

PAGE 1 OF 5

SECTION 01 73 00

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Format and content of manuals.
 - 2. Instruction of Owner's personnel.
 - 3. Schedule of submittals.
- B. Related Work Described Elsewhere:
 - 1. Shop Drawings, Product Data, and Samples: Section 01 34 00
 - 2. Quality Control: Section: 01 40 00
 - 3. Systems Demonstration: Section 01 67 00
 - 4. Project Record Documents: Section 01 72 00
 - 5. Warranties and Bonds: Section 01 74 00
 - 6. Individual Specifications Section: Specific requirements for operation and maintenance data.

1.02 QUALITY ASSURANCE

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT

- A. Prepare data in the form of an instructional manual.
- B. Binders: Commercial quality, 8 1/2 x 11 in. three-ring binders with hardback, cleanable, plastic covers; two in. maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; list title of Project, identify subject matter of contents.
- D. Arrange content under direction of Owner's Maintenance Department. Coordinate with Owner's personnel one week prior to assembly of manuals.

- E. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: manufacturer's printed data, or typewritten data on 24-pound paper.
- G. Drawings: Provide with reinforced punched binders tab. Bind in with text; fold larger drawings to size of text pages.

1.04 CONTENTS, EACH VOLUME

- A. Table of Contents: Provide title of Project, names, addresses, and telephone number of Owner's Representative, subconsultants, and Contractor with name of responsible parties, schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark (by highlighting, etc. each sheet to clearly identify specific products and component model numbers of equipment and materials used, and data applicable to installation. Delete inapplicable information.
 - 1. Furnish a separate complete set of approved product data, in file folders for each Section, with specification item number recorded on folder. Assemble in cardboard "bankers box", in section number sequence. Turn over to the Owner's Representative.
- D. Drawings: Supplement product date to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
 - 1. Furnish a complete set of shop drawings, as installed, and turn over to the Owner's Representative. Fold and place in folders as above for product data, with Drawing and Specification item number recorded on folder. Assemble in same cardboard "banker's box" as above, in Section number sequence.
- E. Type Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 40 00.
- F. Warranties and Bonds: As specified in Section 01 74 00.

1.05 MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for reordering custom manufactured products.
 - 1. Furnish a complete list (room by room) of all paint used. List is to include: paint Manufacturer, Manufacturer's color codes used (by area), and the name, address and phone number of supplier.

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 2.
 Furnish a complete list (room by room) of all floorcovering products used. List is to include: type of floorcovering, manufacturer, manufacturer's color codes used (by area), and the name , address and phone number of Installer.

- 3. Furnish a complete list of all roofing materials used.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in individual product specification Section.
- E. Provide a listing in Index for design data, with tabbed fly sheet and space for insertion of data.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications.
- C. Include color coded wiring diagrams as installed.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.

- K. Provide contractor's coordination drawings, with color coded piping diagrams as installed.
- L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Include test and balancing reports.
- N. Additional Requirements: As specified in individual product specification Sections.
- O. Provide a listing in Index for design data, with tabbed fly sheet and space for insertion of data.

1.07 INSTRUCTION OF OWNER PERSONNEL

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.
- B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.08 SUBMITTALS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Owner's Representative will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes in final form 15 days prior to final inspection. Copy will be returned after final inspection, and after review by Owner's Maintenance Department and with Owner's Representative comments. Revise content of documents as required prior to final submittal.
- D. Submit six copies of revised volumes of data in final form within ten days after final inspection.
- E. A separate chapter will be prepared and submitted for each of the following types of equipment or systems included in the project:
 - 1. Heating, ventilating, and air conditioning system.
 - 2. Control Systems.
 - 3. Plumbing.

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2	4.	Electrical Systems.	
Ę	5.	Emergency Systems.	
6	6.	Communication Systems.	
7			
٤	8.	Miscellaneous Building Equipment.	
9	Access Control Systems.		
	10.	Other equipment or systems as specified in individual specifications Section	n.
PART 2 PRODU	ICTS (r	not used)	
PART 3EXECUT	ΓΙΟΝ (n	not used)	

END OF SECTION

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SECTION 01 74 00

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Preparation and submittal
 - 2. Time and schedules of submittals
- B. Related Work Described Elsewhere:
 - 1. Instructions to Bidders:
 - 2. General Conditions:
 - 3. Contract Close-out Procedures: Section 01 70 00
 - 4. Operation and Maintenance Data: Section 01 73 00
 - 5. Individual Specification Sections: Warranties required for specific products or Work.

1.02 FORM OF SUBMITTALS

- A. Bind in commercial quality, 8-1/2 x 11 in. three ring side binders with hardback, cleanable, plastic covers.
- B. Label cover of each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible principal.
- C. Table of Contents: Neatly typed, in the sequence of index to Project Manual, with each item identified with its Section, and name of product or work item. Provide complete information for each of:
 - 1. Product or work item
 - 2. Supplier with name of principal, address and telephone number
 - 3. Date of beginning of warranty or bond
 - 4. Duration of warranty or bond
 - 5. Provide information for Owner's personnel:
 - a. Proper procedure in case of failure.

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- Instances which might affect validity of warranty or bond.
- 6. Contractor, name of responsible principal, address and telephone number.
- D. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address and telephone number of responsible principal.

1.03 PREPARATION OF SUBMITTALS

b.

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item or work. Except for items put into use with Owner's Representative's permission, leave date of beginning of time of warranty until the Date of Substantial Complete is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

1.04 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with Owner's Representative's permission, submit documents within ten days after acceptance.
- B. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
- C. For items of Work when acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION (not used)

END OF SECTION

PAGE 1 OF 2

SECTION 01 75 00

SPARE PARTS AND MAINTENACE MATERIALS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Products required.
 - 2. Storage and delivery of products.
- B. Related Work Described Elsewhere:
 - 1. Storage and Protection: Section 01 62 00
 - 2. Contract Close-out Procedures: Section 01 70 00
 - 3. Operation and Maintenance Data: Section 01 73 00
 - 4. Individual Specification Sections: Specific requirements for operation and maintenance data.

1.02 PRODUCTS REQUIRED

- A. Provide quantities of products, spare parts, maintenance tools, and maintenance materials specified in individual sections to be provided to Owner, in addition to that required for completion of Work.
- B. Products: Identical to those installed in the work. Include quantities in original purchase from supplier or manufacturer to avoid variations in manufacture.

1.03 STORAGE, MAINTENANCE

- A. Store products with products to be installed in the Work, under provisions of Section 01 62 00.
- B. After delivery of products to site, maintain spare products in same space and condition as products to be installed in the Work.
- C. Maintain spare products in original containers with labels intact and legible, until delivery to Owner.

1.04 DELIVERY

A. Coordinate with Owner's Representative: Deliver and unload spare products to Owner at Project site and obtain receipt prior to final payment. After delivery, Owner will handle and store products.

- B. For portions of Project accepted and occupied by Owner prior to Substantial Completion, deliver a proportional part of spare products to Owner; obtain receipt.
- C. Provide spare parts information for each different item of equipment furnished including:
 - 1. A complete list of parts and supplies and the name and address of a supplier.
 - 2. A list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified to be furnished as part of the contract.
 - 3. A list of additional items recommended by the manufacturer to ensure efficient operation for 180 days.

PART 2PRODUCTS (not used)

PART 3EXECUTION (not used)

END OF SECTION

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SECTION 03 30 00 CAST IN PLACE CONCRETE

PART1 GENERAL

1.01 DESCRIPTION

A. Work Included:

Cast in place concrete required for this project is shown in the Drawings and includes, but is not necessarily limited to footings, foundation walls, slabs on grade, floor slabs, concrete tanks, and concrete reinforcement.

- B. Related Work Described Elsewhere:
 - 1. Section 053100 Steel Decking
 - 2. Section 321313 Concrete Paving

1.02 QUALITY ASSURANCE

A. Codes and Standards:

In general, all concrete work on this Project shall comply with current American Concrete Institute Manuals of Concrete Practices. Comply with all applicable codes and regulations and pertinent portions of the following referenced standards and other standard publications referenced in subsequent articles, which shall become a part of these specifications to the extent of their applicability to the particular product, system, assembly, or item specified:

- 1. ACI 301: "Specifications for Structural Concrete for Buildings".
- 2. ACI 302: "Guide for Concrete Floor and Slab Construction."
- 3. ACI 304: "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete."
- 4. ACI 311: Recommended Practice for Concrete Inspection".
- 5. ACI 315: "Manual of Standard Practice for Detailing Reinforced Concrete Structures."
- 6. ACI 318: "Building Code Requirements for Reinforced Concrete".

- 7. ACI 347: "Recommended Practice for Concrete Formwork".
- B. Conflicts:

In the event of conflict or inconsistency between or among referenced standards and any provisions of this specification, or other Contract Documents, the most stringent requirement shall prevail, and shall be enforced.

- C. Testing:
 - Conduct tests of the concrete during construction in accordance with ACI 301. Submit results of tests for approval. Remove and replace concrete which fails to achieve minimum 28 day compressive strength shown on the Drawings, at Contractor's expense.
 - 2. Test all concrete for footings, slabs, walls, curbs and sidewalks.
 - 3. Reject concrete which fails to meet specified criteria for slump, air content, and temperature.
- D. Frequency of Testing:
 - Slump tests ASTM C-143: Perform one test for each set of compressive strength test specimens.
 - Air content ASTM C-231: Perform one test for each set of compressive strength test specimens.
 - Concrete temperature: Test hourly when ambient air temperature is 40^oF and below, and each time a set of compression test specimens are made.
 - Compression test specimen ASTM C-31:
 One set of three standard cylinders for each compressive strength test. Field cure.
 - Compressive strength tests ASTM C-39: Samples for strength tests for each class of concrete placed each day shall be taken not less than one a day nor less than once for each 20 cu. yd. of concrete, nor less than once for each 1,000 sq. ft. of surface area for slabs.

1.03 SUBMITTALS

Make all submittals in conformance with applicable section of these specifications. Conform with ACI 315 for nomenclature and conventions used in shop and placement drawings:

A. Concrete Materials:

Submit concrete design specification, laboratory test results, and materials list showing source and gradation of all aggregates, type and brand of Portland cement, admixtures source and quality of mixing water, and other aspects of the concrete design.

B. Reinforcing Steel:

Provide Materials Certificates signed by manufacturer and Contractor certifying that each material item complies with, or exceeds, specified requirements.

C. Admixtures:

Provide Materials Certificates signed by manufacturer and Contractor certifying that each material item complies with, or exceeds, specified requirements and that chloride content complies with specification requirements.

1.04 PRODUCT HANDLING

A. Delivery and Storage:

Do not permit delivery of any of the products of this section to the project site until proper facilities, away from traffic, are available for their proper storage and which will permit sorting and handling without endangering the materials themselves or materials for installations of other sections. Store all reinforcing steel on wood dunnage to keep it from direct contact with the ground surface.

B. Repairs & Replacements:

In the event of damage make all repairs and replacements necessary to restore to undamaged condition and do not proceed in those areas until all repairs have been made. Repairs and replacements shall be subject to approval of the Contracting Agency and shall be accomplished at no additional expense to the Owner.

1.05 PROJECT CONDITIONS

A. Protection Against Freezing:

Cover work with temporary or permanent cover as required to protect concrete against possibility of freezing during placement of concrete, and for at least 14 days after placement of concrete.

PART 2 PRODUCTS

2.01 FORMS

A. Material:

Provide new, except as permitted in PART 3 of this section for re-use:

1. Plywood:

U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill oiled and edge sealed, with each piece bearing legible grade mark of a recognized and approved inspection agency.

2. Dimensional lumber:

Him-Fir Number two grade, seasoned

- B. Ties and Spreaders:
 - 1. Provide type providing minimum working strength of 3,000 lbs. when fully assembled, which does not leave open holes through the concrete, and which permits neat and solid patching.
 - 2. Metal shall not be closer than 3/4" to surface when forms are removed.
 - 3. Do not use wire ties and wood spreaders.
- C. Alternate Forming Systems:

Alternate systems will be considered upon submittal.

D. Coatings and Parting Compounds:

Provide commercial fabrication that will not bond with stain or adversely effect concrete surfaces and will not impair subsequent treatment of concrete surfaces to be cured with water or compounds conforming to FSTT-3-001657.

E. Joint Fillers:

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Provide premolded, resilient, waterproof, compressible type with minimum 75% recovery conforming to FS HH-F- 341E, Type II; 1/2" thick for interior joints and 1/2" thick for exterior walks.

F. Other Materials:

Provide all other materials required for complete installation as selected by Contractor subject to the approval of the Contracting Agency.

2.02 REINFORCING

All concrete reinforcement shall be new, free from rust, and shall comply with the following reference standards:

A. Reinforcing Bars:

Provide ASTM A-615 grade 40 or 60 except where noted otherwise.

B. Wire:

Provide ASTM A-82 #16 double annealed iron wire.

C. Welded Wire Fabric:

Provide ASTM A-185 in Flat Sheets.

D. Accessories and Supports:

Provide supports, bolsters, chairs, spacers and other devices and accessories conforming to recommended Concrete Reinforcing Steel Institute (CRSI) practices. Provide galvanized accessories within 1-1/2" of surface of concrete with plastic tip chairs for exposed finish surfaces. Concrete dobie or other block, brick, or wood supports will not be permitted, except where specifically noted.

E. Welding Electrodes:

Conform to AWS Code D12.1.

F. Other Materials:

Provide all other materials, not specifically described but required for a complete and proper installation of concrete reinforcement, as selected by the Contractor, subject to the approval of the Contracting Agency.

2.03 CONCRETE

A. General:

Concrete mixes shall be designed to produce the tabulated properties below, and shall be subject to the approval of the Owner's Representative.

- B. Quality:
 - 1. Provide concrete having 3,000 psi minimum 28 day compressive strengths for footings, walls and slabs, unless noted otherwise in drawings.
 - 2. Provide concrete with maximum aggregate of 3/4" for all concrete except concrete for exposed aggregate surfaces, which shall have a maximum aggregate size of 3/8".
 - 3. Slump at placement shall conform to the following:

Concre	ete Without	Concrete with		
Super	Plasticizer	Super Plasticizer		
Location				
a. Slab on Grade	3 inches	6 to 9 inches		
b. Footings, Walls, Slabs and Beams	4 inches	6 to 9 inches		

- 4. Entrained air content at placement shall be 6% with 1.5% tolerance.
- C. Cement:

Provide portland cement conforming to ASTM C-150, type I or II the product of a single manufacturer.

- D. Aggregates:
 - 1. Provide aggregates conforming to ASTM C-33, current edition, except as expressly permitted by the Contracting Agency.
 - 2. Course aggregate size shall not exceed one-fifth the narrowest dimension between forms, one-third the depth of slabs, nor three-fourths the minimum clear spacing between individual bars or bundles of bars.

- 3. Fine aggregates shall be clean, sharp, natural sand, free from loam, clay, lumps, alkali, organic matter, or other deleterious substances.
- 4. Aggregates shall be well graded, clean, hard gravel and coarse sand, non-frost susceptible material, and free of vegetable matter and coatings of silt or clay. The gradations shall be determined by standard laboratory sieves with square openings. Material retained on a No. 4 screen shall be classified as coarse aggregate, which shall conform to the requirements of AASHTO M-80 and have the following limits of gradation:

COARSE AGGREGATE FOR PCC

Designated Sizes	Perc	ent by wei	ght pas	sing La	boratory	/ Sieve	
(AASHTO Gradation)	having square openings in inches						
	2	1-1/2	1	3⁄4	1/2	3/8	No.4
No.67 (3/4" to No.4)			100	90-10	00	20-55	0-10*

*Not more than 5% shall pass a No. 8 sieve.

All material passing a No. 4 sieve shall be classified as fine aggregate and shall conform to the requirements of AASHTO M-6 and have the following gradation: FINE AGGREGATE FOR PCC

SIEVE SIZE	PERCENT PASSING SIEVE
Passing a 3/8 inch sieve	100
Passing a No. 4 inch sieve	95-100
Passing a No. 8 inch sieve	80-100
Passing a No. 16 inch sieve	45-80
Passing a No. 30 inch sieve	25-60
Passing a No. 50 inch sieve	10-30
Passing a No. 100 inch sieve	2-10

E. Water:

Provide mixing water from an approved source, clean, fresh, and free of acids, alkalis, oil, organic or other deleterious matter.

F. Miscellaneous Inserts:

Provide ASTM A-36 steel.

G. Air Entrainment:

Comply with ASTM C-260.

H. Water Reducing Admixture:

Comply with ASTM C-494.

- I. Epoxy Grout: Provide Master Builder's "Masterflow 713", Sonneborn "Ferrolith", or approved equal.
- J. Joint Sealer: Provide Grace "Daraweld-U Traffic Grade" or approved equal.
- K. Other Materials:

Provide all other materials not specifically described but required for a complete and proper concrete installation, as selected by Contractor and subject to the approval of the Contracting Agency.

- L. Calcium chloride additives are not permitted.
- M. Latex cement leveling compound Laticrete 4237 or approved equal. Provide a smooth trowel finish to accept finishes as scheduled.
- N. Curing Compound:

Curing compounds are not allowed. All surfaces shall be water-cured.

O. Superplasticizers:

- 1. Meet ASTM C 494, Type F or G, of second or third generation type.
- 2. Do not use first generation superplasticizer
- 3. Hold slump to 6" or greater for 2 hours.

- 4. Second Generation Superplasticizer: Batch plant added to extend plasticity time up to 2-1/2 hours, control temperature of fresh concrete, reduce water 20 to 30 percent, and give higher strengths at all ages.
- 5. Third Generation Superplasticizer: Batch plant added to extend plasticity time up to 2-1/2 hours, maintain setting characteristics similar to normal concrete throughout its recommended dosage range and at varying concrete temperatures, reduce water to 30 to 40 percent, and give high-early and ultimate strengths.
- 6. Manufacturer and Product:
 - a. Master Builders, Inc., Cleveland, OH, Rheobuild
 - b. W.R. Grace & Co., Cambridge, MA, Darecem 100.
- P. Synthetic Fiber Reinforcement for Concrete Slabs:
 - 1. 'Forte Fibre' synthetic fiber. Add to mix at rates recommended by fiber manufacturer.

PART 3 EXECUTION

3.01 JOB CONDITIONS

A. Inspection:

Examine the surface of areas to which the concrete work is to be applied and determine that prior work complete, that all subgrades have been properly compacted, graded, that all slab cushions are in place, and that all previous work is complete and ready for erection of forms, setting of reinforcement, and placement of concrete.

B. Discrepancies:

In the event of discrepancy, ambiguity, interference, or any other unanticipated condition which might impede the timely execution of the work of this section, promptly notify the Contracting Agency and do not proceed in the area of discrepancy until all questions in regard thereto have been resolved.

C. Certificates:

Obtain written acknowledgment(s) from the subcontractors or installers of the formwork, reinforcement, and concrete placement that the substrates affecting their work have been examined and found satisfactory for subsequent operations. Such acknowledgments

countersigned by the Contractor and delivered to the Contracting Agency prior to the final inspection, shall be a condition of the acceptance of the work of this section.

D. Admixtures:

Superplasticizers:

- 1. Add at concrete plant only through equipment furnished and/or approved by admixture manufacturer.
- 2. Equipment shall provide for easy and quick visual verification of admixture amount used for each dose.
- 3. Discharge amount to be added to each load of concrete into separate dispensing container, measured verified as to amount, then add to concrete.
- 4. Redosing of Concrete: Not permitted except when approved by inspection agency monitoring concrete quality and only after quality tests show this practice does not decrease the quality specified for concrete.

3.02 NOTICE

Notify the Owner's Representative at least 48 hours prior to beginning any pour of concrete, or 24 hours prior to closing any forms.

3.03 FORMWORK

A. Design:

Design forms to support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure, so that they may be readily removed without impact, shock, or damage to in place concrete and adjacent materials.

- B. Construction:
 - Construct forms to conform with ACI 347, to sizes, shapes, lines, and dimensions shown or as required to obtain accurate alignment, location, grades, and level and plumb work in finished structure. Forms shall be set straight, plumb and true to within 1/4" in 10' of length.

- 2. Provide for openings, offsets, recesses, linkages, keyways, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required to attain the required configuration.
- 3. Use materials selected to achieve the indicated finishes. Solidly butt joints and provide back up to prevent leakage of cement paste.
- 4. Fabricate for easy removal without hammering or prying against concrete surfaces. Provide crush plates where stripping might damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
- 5. Where interior area of formwork is inaccessible, provide temporary openings for cleanout, inspection prior to concrete placement, and for final placement. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.
- 6. Chamfer exposed corners and edges as shown or required using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- C. Form Ties:

Use factory fabricated, adjustable length, removable or snap-off metal form ties, designed to prevent form deflection, and prevent spalling concrete surfaces upon removal. Position ties so portion remaining within concrete after removal is at least 1-1/2" inside the concrete and which will not leave holes larger than 1" diameter in the concrete surface.

D. Coordination With Other Trades:

Provide necessary coordination with other trades to determine size and location of openings necessary for work of those trades. Accurately place and securely support items built into forms.

E. Cleaning & Tightening:

Thoroughly clean forms and adjacent surfaces receiving concrete. Remove chips, wood, sawdust, dirt, and other debris prior to placement of concrete. Retighten forms after concrete placement if required to eliminate mortar leaks.

3.04 PLACING REINFORCEMENT

A. General:

Comply with specified codes and standards and CRSI recommended placing practices for details and methods of placing reinforcement and supports.

B. Cleaning:

Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

- C. Positioning:
 - 1. Support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
 - 2. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold in position during concrete placement. Set wire ties so ends are directed into concrete, not toward exposed surfaces.
 - 3. Do not place reinforcing bars more than 2" beyond the last leg of continuous bar support. Do not use supports as bases for runways for conveying equipment or similar construction loads.
- D. Welded Wire Fabric:
 - 1. Install welded wire fabric. Mats only. No rolled material will be acceptable. Lap adjoining mats a minimum of one and one half meshes and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps.
 - 2. Support welded wire fabric with plastic chairs at intervals not exceeding 4 feet measured along both directions of the mesh. Support welded wire fabric to the middle of the slab thickness.
 - 3. The practice of lifting the welded wire fabric off the subgrade as concrete is poured will be allowed only if after lifting the wire it is supported per Item D, 2 above.

3.05 JOINTS

A. Construction Joints:

Locate and install construction joints which are not shown on the drawings so as not to impair the strength and appearance of the structure, subject to the approval of the Contracting Agency.

Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints.

B. Keyways:

Provide keyways at least 1-1/2" deep in all construction joints in walls, slabs, and between walls and footings; approved bulkheads designed for this purpose may be used for slabs.

C. Contraction Control Joints:

Construct preformed contraction control joints in slabs to form panels of patterns as shown on the drawings.

- D. Expansion:.
 - 1. Expansion joints:

Expansion joint material shall conform to the requirements at ASTM D-994 and AASHTO M-33. Expansion joint material shall extend the full width of the structure and shall be cut to such dimensions that the base of the expansion joint shall extend to the subgrade and the top shall be depressed not less than one-quarter (1/4) inch nor more than one-half (1/2) inch below the finished surface of the concrete.

The material shall be of one (1) piece in the vertical dimension and shall be securely fastened in a vertical position to the existing concrete face against which fresh concrete is to be poured. After the concrete has set, the expansion joints shall be filled flush to the finish concrete surface with asphalt cement, two hundred (200) to three hundred (300) penetration. Application temperature of the sealing asphalt shall be between 250 degrees and 350 degrees Fahrenheit.

Sealing asphalt shall be applied by pouring from a bucket with a V-shaped spout, equipped with a positive shutoff to prevent spilling or dripping of asphalt. Before sealing, the joint shall be cleaned of all dirt, gravel, concrete mortar or other extraneous material. Sealing shall be done in a neat workmanlike manner. Sloppy work in sealing of expansion joints will not be tolerated.

3.06 EMBEDDED ITEMS

Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast in place concrete. Use approved setting drawings, diagrams, instructions, and directions provided by suppliers of the items to be attached thereto.

3.07 PREPARATION OF FORMS

Coat the contact surfaces of forms with an approved coating compound before placement of concrete, and according to manufacturer's instructions. Thin only with approved thinners according to manufacturer's recommendations. Do not permit application of excessive coating compound or allow it to accumulate in the forms or come into contact with concrete surfaces against which fresh concrete will be placed.

Coat steel forms with a non-staining, rust preventative form oil or otherwise protect against rusting. Rust stained steel formwork will not be acceptable and will be rejected.

3.08 CONCRETE PLACEMENT

A. Pre-placement Inspection:

Before placement of concrete, inspect the formwork and reinforcement and verify that all prior work has been completed to the point that placement of the concrete may be executed in complete conformance with the original design, the approved submittals and the referenced standards. Determine that all embedded items, supports, backing, and other provisions for items supported by or attached to the concrete have been provided for. Coordinate with other trades whose work will be affected by the operations of this section. Obtain all written acknowledgments specified in 3.01C above.

B. General:

Comply with ACI 304 and as herein specified. Deposit continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as specified in 3.05. Deposit concrete as nearly as practicable to its final location to avoid segregation due to re-handling or flowing.

- C. Footings and Walls:
 - 1. Deposit in forms in horizontal layers not exceeding 24" in depth and in a manner to avoid inclined construction joints. Where placement consists of several layers, place

each layer while previous layer is still plastic to avoid cold joints. Where vertical drop is more than three feet, elephant trunks shall be used.

- 3. Consolidate by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309 to suit type of concrete and project conditions.
- 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the placed layer and at least 6" into the previous layer. Do not insert vibrators into lower layers of concrete that have begun to set. Limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.
- D. Slabs:
 - 1. Deposit and consolidate in a continuous operation within the limits of construction joints, until the placing of a panel or section is completed.
 - 2. Consolidate by previously specified methods, working concrete around reinforcement, embedded items, and into corners.
 - 3. Bring slab surfaces to the correct level with a straight edge and strikeoff. Use bull floats or darbies to smooth the surface, leaving it free of humps and hollows. Do not sprinkle water onto the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations.
 - 4. Maintain reinforcing in the proper position during all placement and consolidating operations.
- E. Sidewalks, Curb and Gutters:

Concrete shall be handled from transport vehicle to the place of final description in a continuous manner as rapidly as practicable. The rate of placement shall not exceed the rate at which the various placing and finishing operations can be performed in accordance with these specifications. Where the vertical drop is more than three (3) feet, elephant trunks shall be used.

If concrete is to be placed by the extruded method, the Contractor shall demonstrate to the satisfaction of the Contracting Agency that the machine is capable of placing a dense, uniformly compacted concrete to exact section, line and grade.

F. Cold Weather Placement:

Protect placed concrete from physical damage or reduced strength which could be caused by frost, freezing action, or low temperatures, in compliance with ACI 306 and as follows:

- 1. When ambient temperature has fallen to or is expected to fall below 40^oF., uniformly heat water and aggregates prior to mixing to maintain mixture temperature not less than 50^oF. and not more than 80^oF. at point of placement.
- 2. Do not use frozen materials or materials containing ice or snow and do not allow concrete to placed on frozen subgrade or on subgrade containing frozen materials.
- 3. Do not use calcium chloride, salt, or other material containing anti-freeze agents or chemical accelerators unless specifically permitted by the Contracting Agency for the particular situation encountered.

3.09 FINISHING FORMED SURFACES

A. Rough Form Finish:

For formed surfaces not exposed to view in the finish work or by other construction, unless otherwise indicated, provide a surface having the texture imparted by the form facing material used with tie holes and defective areas repaired and patched and fins and other projections chipped down and rubbed off.

B. Smooth Form Finish:

For formed surfaces exposed to view, or that are to be covered with a coating or covering material applied to or bonded directly to the concrete, such as waterproofing, damp proofing, painting or other similar system, provide a surface obtained by selecting form facing material, arranged symmetrically orderly with a minimum of seams. Repair and patch defective areas with fins and projections completely removed and smoothed.

C. Smooth Rubbed Finish:

Provide smooth rubbed finish which has received smooth form finish treatment not later than the day after removal of the forms. Moisten the surfaces and rub with carborundum brick or

other abrasive until a uniform color and texture is attained. Do not apply cement grout other than the created by the rubbing process.

D. Grout Cleaned Finish:

Provide grout cleaned finish as scheduled to surfaces which have received smooth form finish by combining one part of portland cement to 1-1/2 parts fine sand by volume, and mixing with water to the consistency of thick paint. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will closely match adjacent surfaces. Thoroughly wet concrete surfaces and apply grout immediately to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

E. Related Unformed Surfaces:

At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with a texture matching the adjacent surface. Continue the final surface treatment uniformly across adjacent informed surfaces unless otherwise indicated.

3.10 SLAB FINISHES

A. Scratch Finish:

Where scheduled or shown provide scratch finish on monolithic slab surfaces that are to receive topping or mortar setting beds for tile, terrazzo, or other bonded cementitious finishes.

After placement of slab, plane surface to a tolerance not exceeding 1/4" in 24". Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, rakes, or brooms.

B. Float Finish:

Apply float finish to monolithic slab surfaces that are to receive trowel finish and other finishes described in subsequent paragraphs, and surfaces which are to be covered by membrane or elastic waterproofing, roofing, or other finishes as scheduled.

After screeding and consolidating concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit floating of surface. Consolidate surface with power or hand floats or both, using hand floats in small or inaccessible areas. Float surface to a tolerance not exceeding 1/4" in 10' when tested with a 10' straight edge. Cut down high spots and fill in low spots by floating.
Do not apply cement or cement and sand mixture for filling in, use only grout removed from high spots. Uniformly slope to drains. Immediately after leveling refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish:

Apply trowel finish to slab surfaces that are to be exposed to view and surfaces that are to be covered by resilient flooring, paint, or other thin-film finish systems.

After floating, begin first troweling operation with power driven or hand trowels. Begin troweling when surface produces a ringing sound as trowel is moved over surface. Hand trowel as necessary to obtain a smooth surface free of trowel marks and of a uniform texture and appearance, and with a tolerance not exceeding 1/8" in 10' when tested with a 10' straightedge.

D. Broom Finish:

Apply broom finish to exterior and interior platforms, steps, stoops, walks, and ramps, and elsewhere as shown or scheduled.

Immediately after trowel finishing, slightly roughen surface by brooming with a fiber bristle broom perpendicular to direction of travel. Coordinate final finish with Contracting Agency before application.

E. Chemical Hardener/Sealer Finish:

Apply chemical hardener/Sealer finish to interior floors, after complete curing and drying of the concrete surface. Chemical hardeners shall be coordinated with adhesive to be used in conjunction with other flooring materials.

- 1. Apply uniformly, using a garden-type sprayer, industrial sprayer or roller.
- 2. Do not add a thinner.
- 3. When using a short-nap roller, if the rolling action starts to create tiny bubbles on the surface, slow down the rolling motion.
- 4. Do not overlap; avoid thick applications.
- 5. Do not "pull" the material when applying.
- 6. Application rate 350 S.F./gallon.

- F. Exposed Aggregate:
 - 1. Provide exposed aggregate surface at locations indicated in the Drawings.
 - 2. Concrete with a maximum slump of 3" shall be used in exposed aggregate areas. Air entrainment shall be in accordance with specifications.
 - 3. Aggregate shall be 3/8" maximum.
 - 4. Screed concrete to proper level. Do not jitterbug or tamp concrete.
 - 5. Floating shall be limited to amount required to ensure that aggregate is surrounded and only slightly covered by mortar, leaving no holes in the surface.
 - 6. Shortly after floating, Masterbuilders Confilm surface retarder may be sprayed over the surface to allow sufficient time to elapse before exposing operation begins.
 - 7. Exposing operation should begin as soon as brushing and hosing of the surface can be done without over-exposing or dislodging the aggregate. Finishers are to stay off the newly exposed surface to avoid breaking the aggregate bond. If it is necessary for finishers to move about on the newly exposed surface, kneeboards are to be used. Kneeboards shall be gently placed on the surface, and shall not be slid or twisted when on the surface.
 - 8. Exposed aggregate slabs shall be cured thoroughly.

3.11 CURING & PROTECTION

A. General:

Protect freshly placed concrete from premature drying and excessive cold, and maintain without drying at a relatively constant temperature for a period of time necessary for hydration of cement and proper hardening. Conduct all curing operations in compliance with ACI 301 & ACI 308.

- 1. Initiate curing process as soon as free water has disappeared from the concrete surface. Weather permitting, keep continuously moist for not less than 72 hours.
- 2. Begin final curing procedures immediately following initial curing and before concrete has dried.

- 3. Continue curing for a minimum of 10 days after initial placement unless otherwise permitted in writing by Contracting Agency.
- 4. Avoid rapid drying at end of curing period.
- 5. Maintain concrete surface temperature at least 50^oF. for 7 days after following placement of concrete. At least once each shift and once per day on non-work days, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.
- B. Curing Methods:
 - 1. Moisture Curing:
 - a. Keep concrete surface continuously wet by covering with water or continuous fog spray.
 - b. Cover concrete surface with specified absorptive cover, thoroughly saturated with water, and keeping continuously wet. Place absorptive cover to provide coverage at edges, with 4" lap over adjacent absorptive covers.
 - 2. Moisture-cover Curing:

Cover concrete surfaces with moisture retaining cover, placed in widest practicable width with sides and lapped a minimum of 3" and sealed with waterproof tape or adhesive. Immediately repair any holes or tears occurring during curing period using cover material and waterproof tape.

3. Membrane Curing:

Do not use membrane curing compounds.

C. Formed Surfaces:

Cure formed surfaces including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above as applicable.

D. Unformed Surfaces:

Cure formed surfaces such as slabs, floor topping and other similar flat surfaces by application of the approved curing method.

Use moisture retaining curing method for surfaces which are to receive liquid floor hardener or finish flooring, unless otherwise specifically directed in writing by the Contracting Agency.

3.12 FORM REMOVAL

A. Non-Supporting Forms:

Formwork not supporting concrete, such as sides of footings, may be removed after cumulatively curing at not less than 50^oF. for a minimum of 24 hours after placement, provided concrete has sufficiently hardened not to be damaged by removal operations, and providing curing operations are maintained.

B. Supporting Forms:

Formwork supporting weight of concrete such as beam soffits, joints, slabs and other similar structural elements shall not be removed in less than 14 days, and not until design minimum compressive strength for 28 days has been attained, as determined by testing of field cured specimens representative of actual location of the members in question

C. Metal decking forms shall be left in place.

3.13 RE-USE OF FORMS

Re-use of forms will be permitted only under the following conditions, subject to the approval of the Contracting Agency in each instance:

- A. Clean and repair all contact surfaces to achieve capability equal to that of new forms.
- B. Split, frayed, delaminated, or otherwise deteriorated facing or supporting materials <u>will not</u> be permitted.
- C. Apply new coating compound to contact surfaces as specified for new work.
- D. Where forms are extended for successive placement, thoroughly clean all surfaces and tighten to close joints. Align and secure joints to avoid offsets.
- E. Do not use "Patched" forms for exposed surfaces unless specifically permitted in writing by Contracting Agency in each particular instance.

3.14 SURFACE REPAIRS

A. General:

- Repair and patch defective areas with cement mortar immediately after removal of forms, but only when acceptable to Contracting Agency.
 - 1. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete, but in no case greater than 1".
 - 2. Make edges of cuts perpendicular to the concrete surface.
 - 3. Dampen the area to be patched with water and brush coat with neat cement grout or proprietary bonding agent.
- B. Exposed to View Surfaces:
 - 1. Blend white portland cement and standard portland cement so that when dry patching mortar will match color of surrounding surface. Provide test areas at inconspicuous location to verify match.
 - 2. Compact mortar in place and stake off slightly higher than surrounding surface.
 - 3. Apply appropriate finish as provided in 3.09.
 - C. High Areas:

Correct high areas by grinding, after concrete has cured at least 14 days.

D. Low Areas:

Correct low areas during or immediately after completion of surface finishing operations by cutting out the low area and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used upon approval of the Contracting Agency.

- E. Other Repairs:
 - 1. Repair defective areas, except random cracks and single holes not exceeding 1" dia. by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete, and brush with neat cement grout coating or concrete bonding agent. Mix patching concrete of same materials to provide concrete of the same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

- 2. Repair isolated random cracks and single holes not over 1" in dia. by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose cement grout coating or concrete bonding agent. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing #16 screen, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- F. Other Methods:

Repair methods not specified may be used, subject to the approval of the Contracting Agency.

END OF SECTION

SECTION 04 20 00 UNIT MASONRY

- 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 form unit masonry assemblies consisting of concrete form masonry units including rigid insulation within the units.
- B. Related Sections include the following:
 - 1. Division 7 Section "Flashing and Trim" for exposed sheet metal flashing.
- C. Products installed, but not furnished, under this Section include the following:
 - 1. None

1.3 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following net-area compressive strengths (fm) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in TMS 602-11/ACI530.1-11/ASCE6-11.
 - 1. For Concrete Unit Masonry: f'm = As indicated on the drawings.

1.4 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Shop Drawings: Show fabrication and installation details for the following:
 - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
 - 2. Fabricated Flashing: Detail corner units, and other special applications.
- C. Samples for Initial Selection: For the following:
 - 1. Unit masonry Samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
 - 2. Sheet metal flashing colors samples.
 - 3. Color samples of mesh weep vent materials.
- D. Samples for Verification: For the following:
 - 1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.

- 2. Sheet Metal Flashing: 12 inches (300 mm) long. Include fasteners, closures, and other attachments
- 3. Weep holes/vents in color to match mortar color.
- 4. Accessories embedded in the masonry.
- E. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
 - 1. Each type of masonry unit required.
 - a. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.
 - 2. Mortar complying with property requirements of TMS 602-11/ACI530.1-11/ASCE6-11.
 - 3. Grout mixes complying with compressive strength requirements of IBC Standard 2105. Include description of type and proportions of grout ingredients.
- F. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- G. Letter of Recommendation: Provide a letter of recommendation from the CMU and CFMU manufacturer recommending proprietary cleaners and their use on their products.

1.5 QUALITY ASSURANCE

- A. CFMU Installer Qualifications: An experienced installer who employs mechanics who have been licensed or trained in the installation of products similar in material, design, and extent to that indicated for this Project; whose work has resulted in successful CFMU installations. All installing personal must have CFMU Systems training in the installation of this product as provided by the licensing entity.
- B. CFMU Manufacturer: An experienced and licensed manufacturer in the manufacture of CFMU described for this project with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delay to the project schedule.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Source Limitations for Form Masonry Units: Obtain exposed form masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required. Manufacture materials in concurrent batches to maintain color consistency.
- E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- F. Preconstruction Testing Service: Engage a qualified independent testing agency to perform the following preconstruction testing:
 - 1. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C 140.

- 2. Mortar Test: For mortar properties per IBC Standard 21-16.
- 3. Grout Test: For compressive strength per IBC Standard 21-18.
- G. Mockups: Before installing form unit masonry, build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Locate mockups in the locations indicated or, if not indicated, as directed by Architect.
 - 2. Build mockup of typical wall area as shown on Drawings.
 - 3. Build mockups for the following types of masonry in sizes approximately 48 inches long by 48 inches high by full thickness, including accessories. Include a sealant-filled joint at least 16 inches long in each mockup.
 - a. Typical exterior wall with lower corner of window opening. Make opening approximately 12 inches wide by 16 inches high.
 - b. Typical exterior wall with through-wall flashing installed for a 24-inch length in corner of mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
 - c. Combine into one test panel
 - 4. Clean exposed faces of mockups with masonry cleaner as indicated.
 - 5. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 6. Protect accepted mockups from the elements with weather-resistant membrane.
 - 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 8. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
 - 9. Demolish and remove mockups when directed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store CFMU on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

- 1. Protect CFMU from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Protection of CFMU: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building CFMU walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of CFMU to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. 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 CFMU damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in Section 2104.3 of the International Building Code.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until CFMU has dried, but not less than 7 days after completing cleaning.

PART 2 PRODUCTS

2.1 PRODUCTS

A. Products: Subject to compliance with requirements provide "Pentstar" CFMU Building Systems manufactured by a Pentstar licensed manufacturer.

2.2 CONCRETE FORM MASONRY UNITS

- A. General: Provide concrete form masonry units consisting of two masonry face shells joined with High Strength Polymer (manufactured by Pentstar Corp.) cross members dovetailed into the face shells by the manufacturer with rigid insulation insert positioned to create two cavities within the concrete form masonry unit, an air space of not less than ³/₄ inch (20mm) and a form cavity to be grout filled and as follows:
- B. Provide shapes indicated and as follows:
 - 1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 - 2. Provide bullnose units for outside corners, where indicated.
 - 3. Provide square-edged units for outside corners, unless indicated as bullnose.
- C. Exposed Exterior Concrete Form Masonry Unit Face Shells: IBC Standard 21-4 and as follows:
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
 - 2. Weight Classification: Normal weight, unless otherwise indicated.
 - 3. Exposed Faces: Type Smooth
 - a. Color: 5% "Davis Color" at all exterior surfaces.
 - 4. Integral Water Repellent: Provide units made with liquid polymeric, integral waterrepellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive according to ASTM E 514, with test period extended to 24 hours, show no visible water or leaks on the back of the test specimen.
 - a. Products: Subject to compliance with requirements, provide one of the following:

Block Plus W-10; Addiment Inc.

Dry-Block; W. R. Grace & Co., Construction Products Division.

Rheopel; Master Builders.

- D. Exposed Interior Concrete Form Masonry Unit Face Shells: IBC Standard 21-4 and as follows:
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.

- 2. Weight Classification: Normal weight.
- 3. Finish: Exposed faces of the following general description matching color, pattern, and texture of Architect's samples.
 - a. Type: Smooth.
 - b. Color: Provide 5% "Davis Color" at all exposed CFMU in rooms 101A, 102, 103, 104, 107, 108, 109, 117, 118, 119 and 120. Standard concrete color at all surfaces in Apparatus Area walls.

2.3 MORTAR 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: IBC Standard 21-13, Type S.
- C. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- D. Aggregate for Grout: ASTM C 404.
- E. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
- F. Water: Potable.
- G. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Water-Repellent Admixture:
 - a. Mortar Tite; Addiment Inc.
 - b. Dry-Block Mortar Admixture; W. R. Grace & Co., Construction Products Division.
 - c. Rheopel; Master Builders.

2.4 CONCRETE FILL MATERIALS

- A. Portland Cement: ASTM C 150, Type I/II.
- B. Fly Ash: ASTM C 618, Class C or F.
- C. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:
 - 1, Class: Negligible weathering region, but not less than 1N.
 - 2. Nominal Maximum Aggregate Size: 3/8 inch (9 mm).
- D. Water: Potable and complying with ASTM C 94.
- 2.5 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1; or ASTM A 617/A 617M, Grade 60.

2.6 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Shall be as specified in Division 7
- B. Joint Sealant for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for sealing flashing sheets to each other and to substrates.
- C. Fabrication: Shop fabricate flashings from sheet metal indicated above. Extend into wall, turned up not less than 1 inch behind rigid insulation and 1/2 inch out from exterior face of wall, with a hemmed outer edge bent down 30 degrees.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Bond-Breaker Strips: Manufacturer's standard composite flashing product consisting of a pliable and highly adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of 0.030 inch.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dur-O-Barrier; Dur-O-Wal, Inc.
 - b. Perm-A-Barrier Wall Flashing; W. R. Grace & Co., Construction Products Division.
 - c. Textroflash; Hohmann & Barnard, Inc.
 - d. Poly-Barrier Self-Adhering Wall Flashing; Polytite Manufacturing Corp.
 - e. Polyguard 300; Polyguard Products, Inc.
 - f. Everlastic MF-40; Williams Products, Inc.
- B. Weep Vents: 2.5 by 4.0 by 0.5 inch, 200 denier 100% recycled polyester open weave mesh designed to allow airflow and to deter migration of insect to inside wall cavity.
 - 1. Color: To match mortar color.
 - 2. Acceptable Product: Mortar Net weep Vents.
- C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Subject to compliance with requirements, provide one of the following:
 - 1. D/A 811; Dur-O-Wal, Inc.
 - 2. D/A 816; Dur-O-Wal, Inc.
 - 3. No. 376 Rebar Positioner; Heckman Building Products, Inc.
 - 4. #RB Rebar Positioner; Hohmann & Barnard, Inc.
 - 5. #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.

- 6. Double O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America.
- 7. O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America.

2.8 WALL INSULATION INSERTS

Insulation inserts shall be one of three types: Extruded Polystyrene (XPS), Expanded Polystyrene (EPS), Celotex Polyisocyanurate (Polysio).

- A. Extruded-Polystyrene Board Insulation: Rigid, cellular, polystyrene thermal insulation with closed cells and integral high-density skin; formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578, Type IV with height and width sufficient to abut adjacent insulation inserts in an assembled CFMU wall.
 - 1. Thickness: 2 inches minimum.
 - 2. Aged R-Value: Minimum R10.4 for overall thickness.
- B. Expanded Polystyrene Board Insulation: Rigid Cellular, polystyrene thermal insulation with closed cells and integral high-density skin; formed by the expansion of polystyrene base resin in a molding process to comply with ASTM C-578 Type IX (2#) with height and width sufficient to abut adjacent insulation inserts in an assembled CFMU wall.
 - 1. Thickness: 2 inches minimum
 - 2. Aged R-value: Minimum R10 for overall thickness
- C. Tuff R Polyisocyanurate Board Insulation: Rigid insulation with reflective/radiant barrier quality foil facers on both sides, compliant with ASTM C-236/C-518.
 - 1. Thickness: 2 inches minimum
 - 2. Stabilized R-value: Minimum R16 (per manufacturers spec)

2.9 MASONRY FOAM-IN-PLACE INSULATION

- A. Masonry Foam-In-Place Insulation: Single or multiple component thermal foam in place insulation produced by combining a plastic resin and catalyst foaming agent specifically designed for use in conjunction with concrete masonry units.
 - 1. Acceptable Manufacturers:
 - a. Thermal Corporation of America
 - b. Tailored Chemical Products
 - c. CP Chemical Company
 - d. Fomo Products Inc.

2.10 MASONRY CLEANERS

- A. Proprietary Commercial Cleaners: Provide proprietary commercial cleaners as recommended by the masonry manufacturer for use on their products.
- 2.11 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the 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 Form unit masonry: Comply with IBC Standard 21-15, Proportion Specification.
 - 1. Limit cementitious materials in mortar to portland cement, and lime.
 - 2. For masonry below grade, in contact with earth, and where indicated, use Type S or RS.
 - 3. For reinforced masonry and where indicated, use Type S or RS.
 - 4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N or RN.
 - 5. For exposed masonry provide water repellant treated mortar per water repellant manufacturer's recommended rate.

2.12 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
 - 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.
- C. Concrete fill: Proportion normal-weight concrete mix as follows:
 - 1. Compressive Strength (28 Days): 3000 psi (20.7 MPa).
 - 2. Maximum Slump: 8 inches (200 mm) in accordance with ASTM C 143.

2.13 SOURCE QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform source quality-control testing indicated below:
 - 1. Payment for these services will be made by Owner.
 - 2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C 140.
- PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

- A. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange units for exposed form unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.

3.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.
- D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
- F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.4 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. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
 - 1. One-half running bond with vertical joint in each course centered on units in courses above and below.
- C. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- E. Fill space between hollow-metal frames and masonry solidly with concrete fill, unless otherwise indicated.
- F. Keep cavities clean of mortar droppings and other materials during construction.
- G. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
 - 1. Construct formwork to conform to shape, line, and dimensions shown. Make it 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 temporary loads that may be placed on them during construction.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay form masonry units as follows:
 - 1. With full mortar coverage on horizontal and vertical face shells.
 - 2. At exterior face shell, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the face shell.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.
 - 1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

3.6 FOAM-IN-PLACE INSULATION

A. Install foam-in-place insulation where indicated and at voids at control joints, window bucks, window and door frames, thermal breaks and voids between rigid insulation inserts and dissimilar material.

3.7 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by form masonry unit assemblies. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

- 1. Install anchor bolts, accurately located, to elevations required.
- 2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control joints in form unit masonry where indicated. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints as follows:
 - 1. Fit rigid insulation strips into hollow contour concrete form masonry units at control joint. Fill resultant cores with concrete fill and rake joints in exposed faces.
 - 2. Keep head joints free and clear of mortar or rake joint.

3.9 LINTEL FORMS

- A. Install steel lintel forms where indicated.
- B. Provide minimum bearing of 2 inches (50 mm) at each jamb, unless otherwise indicated.
- 3.10 FLASHING, WEEP HOLES, AND VENTS
 - A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
 - 1. Extend flashing to inside of rigid insulation and turn up not less than 1 inch (25 mm).
 - 2. Extend flashing a minimum of 2 inches into masonry at each end of lintel, shelf angle, heads and sills.
 - 3. Extend sheet metal flashing 1/2 inch beyond face of masonry at exterior and turn flashing down to form a hemmed drip.
 - B. Install vents in vertical head joints at the top of each continuous cavity at spacing indicated. Use plastic weep hole/vents to form vents.
 - C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 STEEL REINFORCEMENT

- A. Placing Reinforcement: Comply with requirements of Section 2104.5 of the Uniform Building Code.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover of not less than 1/2 inch.
- D. Place reinforcement prior to concrete fill placement.

E. Splice lap reinforcement not less than 40 bar diameters. Maintain not less than one reinforcement bar diameter between vertical reinforcement installations.

3.12 CONCRETE FILL PLACEMENT

- A. Filling of Concrete Cavity: Do not place concrete fill until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - 1. Before placement of concrete fill verify that reinforcing bars are correctly positioned with proper lap and alignment, and that the cavity is free from debris, obstructions, and excessive mortar droppings that would create voids in the concrete pour.
 - 2. Solidly fill cavity with concrete in lifts not to exceed 4 feet in height, with not more than two lifts (10ft) placed in one operation. Stop concrete pour 1-1/2 inch (36 mm) below top of cavity to form key for the next concrete fill operation.
 - 3. If necessary, consolidate concrete immediately after placement of each lift by mechanical vibration to eliminate voids in concrete mass, using a "pencil" vibrator with a diameter of 1 inch or less. DO NOT VIBRATE MORE THAN 6 FEET IN DEPTH INTO ANY CONCRETE LIFT.

3.13 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform field quality-control testing indicated below.
 - 1. Payment for these services will be made by Owner.
 - 2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.
- C. Mortar properties will be tested per IBC Standard 21-16.
- D. Concrete fill testing per Division 3 Section "Cast In Place Concrete" for field quality control testing requirements.

3.14 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.
- C. In-Progress Cleaning: Clean form unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry per masonry manufacturer's written recommendations.
- 3.15 MASONRY WASTE DISPOSAL

A. Excess Masonry and Waste: Remove excess masonry and waste and legally dispose of off Owner's property.

END OF SECTION

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CONCRETE UNIT MASONRY

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS:
 - A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.02 DESCRIPTION OF WORK:
 - A. Extent of each type of masonry work is indicated on drawings and schedule.
 - B. Types of masonry work required include:
 - 1. Section 042000 Unit Masonry.

1.03 QUALITY ASSURANCE:

- A. Fire Performance Characteristics: Where indicated, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with ASTM E 119 by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.
- B. Single Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
- C. Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
- D. CMU Installer Qualifications: An experienced installer who employs mechanics who have been trained in the installation of products similar in material, design, and extent to that indicated for this Project; whose work has resulted in successful CMU installations.

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1.04 SUBMITTALS:

- A. Product Data: Submit manufacturer's product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.
- B. Mill Certificates: Submit steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel required for project.
- C. Samples for verification purposes of the following:
 - 1. Full-size CMU Samples: Provide at least one full size CMU for each color, texture and size.
 - 2. Colored Masonry Mortar Samples: Provide at least one mortar sample for each color fully labeled to indicate type and amount of color admixture used.
- D. Dry-Block CMU Fabricator qualification Certification: Provide a copy of the current Dry-Block Producer Certificate of Qualification as issued on an annual basis by W.R. Grace & Co.
- E. Water Permeance Site Test Kit: Provide a Dry-Block Wall Spray Bar Test Kit for site testing of water permeance of erected Dry-Block CMU mock-up panel.
- 1.05 DELIVERY, STORAGE, AND HANDLING:
 - A. Deliver masonry materials to project in undamaged condition.
 - B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.
 - Limit moisture absorption of concrete masonry units during delivery and until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity as reported by the US Weather Bureau Station nearest project site.
 - C. Store cementitious materials off the ground, under cover and in dry location.
 - D. Store aggregates where grading and other required characteristics can be maintained.

1.06 PROJECT CONDITIONS:

- A. Protection of Work: During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.
- B. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- C. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.
- D. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.
- E. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.
- F. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
- G. Protect sills, ledges and projections from droppings of mortar.
- H. Cold Weather Protection:
 - 1. Do not lay masonry units which are wet or frozen.
 - 2. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.
 - 3. Remove masonry damaged by freezing conditions.
- I. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperatures existing at time of installation except for grout.
 - 1. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10 deg. F (6 deg. C).
 - 2. 40 deg. F (4 deg. C) to 32 deg. F (0 deg. C):
 - a. Mortar: Heat mixing water to produce mortar temperature between 40 deg. F (4 deg. C) and 120 deg. F (49 deg. C).

- b. Grout: Follow normal masonry procedures.
- 3. 32 deg. F (0 deg. C) to 25 deg. F (-4 deg. C):
 - a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 deg. F (4 deg. C) and 120 deg. F (49 deg. C); maintain temperature of mortar on boards above freezing.
 - b. Grout: Heat grout materials to 90 deg. F (32 deg. C) to produce in-place grout temperature of 70 deg. F (21 deg. C) at end of work day.
- 4. 25 deg. F (-4 deg. C) to 20 deg. F (-7 deg. C):
 - Mortar: Heat mixing water and sand to produce mortar temperatures between 40 deg. F (4 deg. C) and 120 deg. F (49 deg. C); maintain temperature of mortar on boards above freezing.
 - b. Grout: Heat grout materials to 90 deg. F (32 deg. C) to produce in-place grout temperature of 70 deg. F (21 deg. C) at end of work day.
 - c. Heat both sides of walls under construction using salamanders or other heat sources.
 - d. Use windbreaks or enclosures when wind is in excess of 15 mph.
- 5. 20 deg. F (-7 deg. C) and below:
 - a. Mortar: Heat mixing water and sand to produce mortar temperatures between 40 deg. F (4 deg. C) and 120 deg. F (49 deg. C).
 - b. Grout: Heat grout materials to 90 deg. F (32 deg. C) to produce in-place grout temperature of 70 deg. F (21 deg. C) at end of work day.
 - c. Masonry Units: Heat masonry units so that they are above 20 deg. F (-7 deg. C) at time of laying.
 - d. Provide enclosure and auxiliary heat to maintain an air temperature of at least 40 deg. F (4 deg. C) for 24 hours after laying units.
- 6. Do not heat water for mortar and grout to above 160 deg. F (71 deg. C).

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- J. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.
 - 1. 40 deg. F (4 deg. C) to 32 deg. F (0 deg. C):
 - a. Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.
 - 2. 32 deg. F (0 deg. C) to 25 deg. F (-4 deg. C):
 - Completely cover masonry with weather-resistive membrane for at least 24 a. hours.
 - 3. 25 deg. F (-4 deg. C) to 20 deg. F (-7 deg. C):
 - Completely cover masonry with weather-resistive insulating blankets or similar a. protection for at least 24 hours, 48 hours for grouted masonry.
 - 4. 20 deg. F (-7 deg. C) and below:
 - a. Except as otherwise indicated, maintain masonry temperature above 32 deg. F (0 deg. C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40 deg. F (4 deg. C) for 48 hours.

PART 2 - PRODUCTS

- CONCRETE MASONRY UNITS: 2.01
 - Α. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.
 - 1. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
 - 2. Provide square-edged units for outside corners. For outside corners at interior locations, provide square edge units with corner eased to 1/4" radius.
 - Β. Concrete Block: Provide units complying with characteristics indicated below for Grade, Type, face size, exposed face and, under each form of block included, for weight classification.

- 1. Grade N.
- 2. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" high (15-5/8" x 7-5/8" actual) x thickness' indicated.
- 3. Type I, moisture-controlled units.
- 4. Exposed Faces: One of Manufacturer's standard colors and texture, unless otherwise indicated.
 - a. Provide units with exposed faces of the following general description matching color and texture of Architect's sample.
 - (1) Split Face where indicated on the drawings
 - (2) Smooth Face unless otherwise note on the drawings.
 - b. Where special patterns are indicated, provide units with exposed faces matching color, texture and pattern of Architect's sample.
- 5. Hollow Load-bearing Block: ASTM C 90 and as follows:
 - a. Weight Classification: Normal weight.
 - b. Minimum Face Shell Thickness: 1 1/4". For Split Face units, a maximum of 10 percent of a shipment may have face-shell thicknesses less than 1 1/4" but in no case may the face-shell thickness be less than 3/4 inch.
- 6. Provide Water Resistant Admixture: "Dry-Block" as manufactured by W.R. Grace & Co. per the manufacturer's written instruction. Delete admixture at all interior CMU.

2.02 MORTAR AND GROUT MATERIALS:

- A. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold weather construction. Provide natural color or white cement as required to produce required mortar color.
- B. Masonry Cement: ASTM C 91.
- C. Hydrated Lime: ASTM C 207, Type S.

- D. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4" use aggregate graded with 100% passing the No. 16 sieve.
- E. Aggregate for Grout: ASTM C 404.
- F. Water: Clean and potable.
- 2.03 REINFORCING BARS
 - A. Reinforcing Bars: Deformed steel, ASTM A 615, Grade 60 for bars No. 3 to No. 18.
 - 1. Shop fabricate reinforcing bars which are shown to be bent or hooked.

2.04 MASONRY CLEANERS:

- A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2 cup dry measure) and laundry detergent (1/2 cup dry measure) dissolved in one gallon of water.
- B. Acidic Cleaner: Manufacturer's standard strength general purpose cleaner designed for new masonry surfaces of type indicated; composed of blended organic and inorganic acids combined with special wetting systems and inhibitors; expressly approved for intended use by manufacturer of masonry units being cleaned.
 - 1. Available Products: Subject to compliance with requirements, a product which may be used to clean unit masonry surfaces includes, but is not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide the following:
 - a. "Sure Klean" No. 600 Detergent; ProSoCo, Inc.

2.05 MORTAR AND GROUT MIXES:

- A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
- B. Mixing: Combine and thoroughly mix cementitious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.

- 1. Limit cementitious materials in mortar to portland cement-lime.
- 2. Mortal Type
 - a. Use type M mortar for all exterior masonry.
 - b. Use type S mortar for interior masonry.
- 3. Provide Dry-Block mortar additive by W.R. Grace & Co. at all exterior mortar. Mix per manufacturer's written instruction. Delete additive at interior CMU.
- D. Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of reinforced and nonreinforced unit masonry. Use grout of consistency indicated or if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout. Provide grout with 9" slump, +/- 1".
 - 1. Use fine grout in grout spaces less than 2" in horizontal direction, unless otherwise indicated.
 - 2. Use coarse grout in grout spaces 2" or more in least horizontal dimension, unless otherwise indicated.

PART 3 - EXECUTION

- 3.01 INSTALLATION, GENERAL:
 - A. Do not wet concrete masonry units.
 - B. Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.
 - C. Thickness: Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
 - D. Build chases and recesses as shown or required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.
 - E. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.

- F. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.
 - 1. Use dry cutting saws to cut concrete masonry units.
- G. Review ACI 530.1, Mandatory Specification Checklist, for additional requirements necessary for specific project. Information included in this guide specification for installation indicates criteria necessary for proper performance and is required by GRACE CONSTRUCTION PRODUCTS.
 - 1. CMU Erection:
 - a. Comply with ACI 530.1 and NCMA TEK Bulletins.
 - b. Review and comply with specific detail drawings for water-repellent wall systems from W.R. GRACE & CO. CONN.
 - 2. Laying Masonry Walls:
 - a. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.
 - b. Provide a solid surface at flashing areas using inverted lintel CMU, solid CMU, or filled CMU, per GRACE DETAIL DRAWINGS.
 - 3. Mortar Bedding and Jointing:
 - a. Lay hollow CMU units with face shell bedding using mortar containing DRY-BLOCK MORTAR ADMIXTURE.
 - b. Flash at all breaks in wall face with PERM-A-BARRIER WALL FLASHING and coordinate with weeps per GRACE DETAIL DRAWINGS.
 - c. Tool all major joints. Rake joints are not permitted unless properly caulked.
 - d. Care should be taken to remove mortar containing DRY-BLOCK MORTAR ADMIXTURE from the face of masonry units before it sets.
 - e. Cover top courses at the end of the work day, and follow other industry recommendations for proper protection and curing of the wall.
 - 4. Movement Control and Expansion Joints:

a. Provide vertical and horizontal expansion, control and isolation joints in masonry sufficient accommodate shrinkage of CMU and mortar per ACI 530.1.

3.02 CONSTRUCTION TOLERANCES:

- A. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10', 1/2" maximum.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".
- E. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

3.03 LAYING MASONRY WALLS:

- A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.
- B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.
- C. Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs of starting courses in mortar. Maintain head and bed joint widths shown, or if not shown, provide 3/8" joints.
- D. Pattern Bond: Lay exposed masonry in the bond pattern shown or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than

2". Bond and interlock each course of each wythe at corners. Do not use units with less that nominal 4" horizontal face dimensions at corners or jambs.

- 1. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimension indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.
- 2. Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms.
 - a. Option: Where all vertical cores are not shown to be grouted, Contractor may elect to fill all vertical cores with grout. In which case, requirements for mortar bedding of cross-webs and closing of core spaces below bond beams do not apply.
- E. Stopping and Resuming Work: Rack back 1/2-unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.
- F. Built-in Work: As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.
 - 1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
 - a. At exterior frames fill frame with foamed-in-place polystyrene insulation.
 - 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
 - 3. Fill cores in hollow concrete masonry units with grout 3 courses (24") under bearing plates, beams, lintels, posts and similar items, unless otherwise indicated.

3.04 MORTAR BEDDING AND JOINTING:

A. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or

grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.

- B. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.
- C. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.
- D. Tool exposed joints slightly concave using a jointer larger than joint thickness, unless otherwise indicated.
- E. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

3.05 PLACING REINFORCEMENT

- A. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.
- B. Position reinforcement accurately at the spacing indicated. Support and secure vertical bars against displacement. Horizontal reinforcement may be placed as the masonry work progresses. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1" (whichever is greater).
- C. Splice reinforcement bars where shown; do not splice at other points unless acceptable to the Architect. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or attaching to dowels, lap ends, place in contact and wire tie.
 - 1. Provide not less than minimum lap indicated, or if not indicated, as required by governing code.
- D. Anchoring: Anchor reinforced masonry work to supporting structure as indicated.

3.06 GROUTING:

- A Use "Fine Grout" per ASTM C 476 for filling spaces less than 4" in one or both horizontal directions.
- B. Use "Coarse Grout" per ASTM C 476 for filling 4" spaces or larger in both horizontal directions.

- C. Grouting Technique: At the Contractor's option, use either low-lift or high-lift grouting techniques subject to requirements which follow.
- D Low-Lift Grouting:
 - 1. Provide minimum clear dimension of 2" and clear area of 8 sq. in. in vertical cores to be grouted.
 - 2. Place vertical reinforcement prior to laying of CMU. Extend above elevation of maximum pour height as required for splicing. Support in position at vertical intervals not exceeding 192 bar diameters nor 10 ft.
 - 3. Lay CMU to maximum pour height. Do not exceed 5' height, or if bond beam occurs below 5' height stop pour at course below bond beam.
 - 4. Pour grout using chute or container with spout. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pours 1-1/2" below top course of pour.
 - 5. Bond Beams: Stop grout in vertical cells 1-1/2" below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.
- E. High-Lift Grouting:
 - 1. Do not use high-lift grouting technique for grouting of CMU unless minimum cavity dimension and area is 3" and 10 sq. in., respectively.
 - 2. Provide cleanout holes in first course at all vertical cells which are to be filled with grout.
 - a. Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell.
 - 3. Construct masonry to full height of maximum grout pour specified, prior to placing grout.
 - a. Limit grout lifts to a maximum height of 5' and grout pour to a maximum height of 24', for single wythe hollow concrete masonry walls, unless otherwise indicated.

- 4. Place vertical reinforcement before grouting. Place before or after laying masonry units, as required by job conditions. Tie vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 192 bar diameters nor 10'.
 - a. Where individual bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of reinforcement bar, pull loops and bar to proper position and tie free ends.
- 5. Where reinforcement is prefabricated into cage units before placing, fabricate units with vertical reinforcement bars and lateral ties of the size and spacing indicated.
- 6. Place horizontal beam reinforcement as the masonry units are laid.
- 7. Embed lateral tie reinforcement in mortar joints where indicated. Place as masonry units are laid, at vertical spacing shown.
 - a. Where lateral ties are shown in contact with vertical reinforcement bars, embed additional lateral tie reinforcement in mortar joints. Place as shown, or if not shown, provide as required to prevent grout blowout or rupture of CMU face shells, but provide not less than No. 2 bars or 8-gage wire ties spaced 16" o/c. for members with 20" or less side dimensions, and 8" o/c. for members with side dimensions exceeding 20".
- 8. Preparation of Grout Spaces: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcement and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.
- 9. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.
- 10. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect.
- Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 5'. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Rod or vibrate each grout lift during pouring operation.

- a. Place grout in lintels or beams over openings in one continuous pour.
- 12. Where bond beam occurs more than one course below top of pour, fill bond beam course to within 1" of vertically reinforced cavities, during construction of masonry.
- 13. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 1-1/2" of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence if more pours are required.

3.07 REPAIR, POINTING AND CLEANING:

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.
 - 4. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 5. Use bucket and brush hand cleaning method described in BIA "Technical Note No. 20 Revised" to clean brick masonry made from clay or shale, except use masonry cleaner indicated below.
 - a. Detergent.
- b. Acidic cleaner; apply in compliance with directions of cleaner manufacturer.
- 6. Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.
- D. Protection: Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

3.08 FIELD QUALITY CONTROL:

- A. Contractor will employ separate testing laboratory to perform field quality control testing.
- B. Unit Test Method:
 - 1. Mortar Tests: For each type indicated, test mortar by methods of sampling and testing of ASTM C 780. Conduct tests no less frequently than that required to evaluate mortar used to install each increment of masonry units indicated above from which samples are taken for testing.
 - 2. Grout compressive tests will be performed in accordance with the requirements for cast-in-place concrete as specified in Section 033000.
- C. Report test results in writing and in form specified under each test method, to Architect and Contractor, on same day tests are made.

3.09 SPECIAL INSPECTION

- A. The Owner will employ and pay for the services of a Special Inspector to perform the following Special Inspections:
 - 1. For partially grouted walls, during preparation and taking of any required prisms or test specimens, placing of all masonry units, placing of reinforcing, inspection of grout space, immediately prior to closing of cleanouts and during grouting operations.
 - 2. For fully grouted walls, during preparation and taking of any required prisms or test specimens, at the start of laying units, after the placement of reinforcing steel, grout space prior to grouting operation, and during all grouting operations.
- B. The special inspector shall furnish inspection reports to the Building Official, the Engineer of Record and Owner. All discrepancies shall be brought to the immediate attention of the contractor for correction.

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SECTION - 05 12 00	STRUCTURAL STEEL FRAMING

PART 1GENERAL

1.01 DESCRIPTION

A. Work Included:

Structural metal framing for this Work is indicated in the Drawings and includes but is not necessarily limited to:

- 1. Beams
- 2. Bases
- 3. Columns
- 4. Structural Steel Accessories
- B. Related Work Described Elsewhere:
 - 1. Steel Decking: Section 053100
 - 2. Steel Joist Framing: Section 052100

1.02 QUALITY ASSURANCE

- A. Qualifications of Suppliers and Personnel:
 - 1. For the fabrication of the structural steel employ only a firm regularly established in the fabrication of structural steel.
 - 2. For the erection of the structural steel employ only a firm regularly established in the erection of structural steel.
 - 3. For welding of structural steel, (except for welds which do not carry calculated stresses) employ only welders who are currently qualified as prescribed in "Qualification Procedure" of the American Welding Society.
 - 4. Credentials of welders are to be presented to the Owner's Representative prior to work starting. Credentials to include current welders certificate indicating type of test, position of welds, etc.

- B. Codes and Standards:In addition to complying with all pertinent codes and regulations, comply with:
 - 1. "Specifications for the Design Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction.
 - 2. "Code for Welding in Building Construction" of the American Welding Society.

1.03 SUBMITTALS

- A. Provide certificates of compliance with referenced standards, and certification of selected fabricator's and erector's qualifications.
- B. Provide shop drawings for all structural steel.
- C. Provide engineered design for field splices, with shop drawings stamped by a Structural Engineer licensed to practice in the State of Alaska.
- D. Provide welder certifications for all welders performing work.

1.04 PRODUCT HANDLING

Do not deliver any of the structural steel to the jobsite until a secure area away from traffic is available for its storage, permitting its sorting and handling without endangering other stored materials. Take all measures necessary to protect the structural steel from damage and to protect the installed work and materials of all other trades.

In the event of damage to either the structural steel, or to other materials or work, make all repairs and replacements necessary to restore the original undamaged conditions. Repairs and replacements shall be subject to the approval of the Architect and shall be accomplished at no additional expense to the Owner.

PART 2 PRODUCTS

- 2.01 STRUCTURAL STEEL
 - A. Shapes and Plates:Provide steel plates and shapes conforming to ASTM A-36, (Fy) = 36ksi.
 - B. Wide Flange Beams:Provide wide flange beams conforming to ASTM A992, (Fy) = 50ksi.

 C. Rectangular Tubing: Provide rectangular steel tubing complying with ASTM A-500, Grade B with yield strength (Fy) = 46 ksi.

2.02 BOLTS AND NUTS

A. Machine and Anchor Bolts: Comply with ASTM A-307.

2.03 PRIMER PAINT

Provide primer paint which is compatible with finish coatings specified in Section 09900. Where no finish coating is specified, provide primer complying with FS TT-P-31D.

2.04 NEOPRENE BEARING PADS

- A. Provide AASHTO grade , 60 Durometer, neoprene of size and thickness indicated.
 - 1. Hardness per ASTM D2240:60+52. Tensile Strength per ASTM D412:2500 psi3. Ultimate Elongation per D2240:350%
 - 4. Low Temperature Test per ASTM D476: No Failure

2.05 OTHER MATERIALS

All other materials, not specifically described but required for a complete and proper installation of structural steel shall be new, free from rust, first quality of their respective kinds, and subject to the approval of the Architect.

PART 3EXECUTION

3.01 FABRICATION

A. General:

Fabricate all structural steel in strict accordance with the approved shop drawings and the referenced standards.

B. Shop Cleaning and Priming:

- 1. Shop paint all structural steel one coat except steel to be encased in concrete and surfaces requiring field welding.
- 2. Thoroughly clean all steel for concrete encasement.

3.02 WELDING

Unless Otherwise Specifically Noted:

- A. Follow applicable portions of American Welding Society specifications in all welds.
- B. Use ASTM A-233, E-60, or E-70 electrodes. Store electrodes in on site warming ovens at all times.
- C. Make all finish welds 3/16" minimum.
- D. Make all butt welds full penetration, using back up or chip and back weld.

3.03 JOB CONDITIONS

Determine that all previous work is complete and ready for the erection of the structural steel. Promptly notify the Architect of discrepancies and do not proceed in the questioned areas until fully resolved.

3.04 ERECTION

Erect all structural steel in accordance with the original design and the approved submittals, all pertinent codes and regulations, and the referenced standards.

Align structural steel straight, true, square and plumb, and within a tolerance of 1 in 500.

After erection is complete, touch up all shop priming coats damaged during transportation and erection, and prime all field welds using same primer paint approved for shop priming.

SECTION 05 21 00 STEEL JOIST FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this section.

1.02 SUMMARY

A. This Section includes steel joists with bridging, attached seats and anchors.

1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.
- B. Product data including manufacturer's specifications and installation instructions for each type of joist and accessories.
- C. Shop Drawings showing configuration, sizes, spacing locations and types of joists, anchorage details, joist leg extensions, bridging, supplementary framing, other accessories.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards except as otherwise indicated:
 - 1. Steel Joist Institute "Standard Specifications for Open Web Steel Joists, K series and LH series, as indicated on the drawings.
 - 2. Utilize load tables, and weight tables.
- PART 2 PRODUCTS

2.01 MATERIALS

- A. Open Web Steel Joist Members: K series, LH series, as indicated on the drawings
- B. Anchor Bolts, Nuts, and Washers: ASTM A307
- C. Primer: FS TT-P-636.
- D. Supplementary Framing: ASTM A-36.
- E. Welding Materials: AWS D1.1; type required for materials being welded.

2.02 FABRICATION

A. Provide bottom and top chord extensions as indicated.

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2.03 FINISH

- A. Shop prime joists.
- PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

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

3.02 ERECTION

- A. Erect and bear joists on supports.
- B. Allow for erection loads. Provide temporary bracing to maintain framing in alignment until completion of erection and installation of permanent bridging and bracing.
- C. After joist alignment, field weld joist seat to bearing surfaces.
- D. Position and field weld joist chord extensions and wall attachments.
- E. Frame openings greater than 16 inches with supplementary framing.
- F. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 BRIDGING AND BRACING

A. Install permanent bridging and bracing in accordance with joist manufacturer's recommendations.

SECTION 05 31 00 STEEL DECKING

PART 1GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this section.

1.02 SUMMARY

A. This Section includes steel deck units for floor applications.

1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.
- B. Product data including manufacturer's specifications and installation instructions for each type of decking and accessories.
 - 1. Provide test data for mechanical fasteners used in lieu of welding for fastening deck to supporting structures.
- C. Shop Drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards except as otherwise indicated:
 - 1. American Iron and Steel Institute (AISI) "Specification for the Design of Cold-Formed Steel Structural Members."
 - 2. American Welding Society (AWS), D1.3 "Structural Welding Code Sheet Steel."
 - 3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."
- B. Qualifications of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.
 - 1. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work at no charge to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

 A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following: Canam Steel Corporation United Steel Deck Vulcraft Div., Nucor Corp. Verco Manufacturing Co. Wheeling Corrugating Co.

2.02 MATERIALS

- A. Steel for Galvanized Metal Deck Units: ASTM A 446, grade as required to comply with SDI specifications.
- B. Miscellaneous Steel Shapes: ASTM A 36.
- C. Shear Connectors: Headed stud type, ASTM A 108, Grade 1015 or 1020, cold-finished carbon steel, with dimensions complying with AISC specifications.
- D. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.
- E. Galvanizing: ASTM A525, G60 unless noted otherwise on the drawings.
- F. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

2.03 FABRICATION

- A. General: Form deck units in lengths to span three or more supports, with flush, telescoped, or nested 2 inch laps at ends and interlocking or nested side laps, of metal thickness, depth and width as indicated.
- B. Composite Steel Floor Deck: Fabricate deck units with integral embossing or raised pattern to furnish mechanical bond with concrete slabs. Fabricate open-beam deck units with fluted section having interlocking side laps.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Install deck units and accessories in accordance with manufacturer's recommendations, shop drawings, and as specified herein.
 - 1. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
 - 2. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.
 - 3. Place deck units flat and square, secured to adjacent framing without warp or deflection.

- 4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
- 5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- 6. Do not use floor deck units for storage or working platforms until permanently secured.
- B. Fastening Deck Units:
 - 1. Fasten floor deck units to steel supporting members by nominal 3/4 inch puddle welds or elongated weld of equal strength, spaced not more than 6 inches on center with a minimum of two welds per unit at each support.
 - a. Tack weld or use self tapping No. 8 or larger machine screws at 4 feet on center for fastening end closures.
 - 2. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
 - a. Use welding washers where recommended by deck manufacturer.
- C. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking as shown.
- D. Reinforcing at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.
- E. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.
- F. Shear Connectors: Weld shear connectors to supports through decking units in accordance with manufacturer's instructions. Do not weld shear connectors through two layers (lapped ends) of decking units. Weld only on clean dry deck surfaces.

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SECTION 05 40 00 COLD-FORMED METAL FRAMING

1.01 DESCRIPTION

- A. Work Included:
 - 1. Non-load bearing formed steel stud and joist framing; 16 ga.
 - 2. Fasteners and accessories.
- B. Related Work Described Elsewhere:
 - 1. Structural Steel Framing Section 051200
- C. References:
 - 1. American Society for Testing and Materials (ASTM):
 - a. A90-81 Weight of Coating on Zinc-Coated (Galv.) Iron or Steel Articles.
 - b. A446-83 Steel Sheet, Zinc-Coated (Galv.) by Hot-Dip Process, Physical (Structural) Quality.
 - c. A570-84a Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
 - d. A611-84 Steel, Cold-Rolled Sheet, Carbon, Structural.
 - e. D1187-82 Asphalt-Based Emulsions for Use as Protective Coatings for Metal.
 - 2. American Iron and Steel Institute (AISI) : Specification for the Design of Cold-Formed Steel Structural Members 19980 Edition.
 - 3. American National Standards Institute (ANSI) : A58.1-82 Minimum Design Loads for Building and Other Structures.
 - 4. American Welding Society (AWS) :
 - a. C1.3-70 Recommended Practices for Resistance Welding Coated Low Carbon Steels.
 - b. D1.1 Structural Welding Code.
 - 5. Federal Specifications (FS) :
 - a. FF-B-561 Bolt (Screw), Lag
 - b. FF-S-92 Screw, Machine, Slotted, Cross Recessed or Hexagon Head.
 - c. FF-W-84 Washer, Lock (Spring)
 - d. FF-W-92 Washer, Plat (Plain)

e. TT-P-645 Primer, Paint, Zinc Chromate, Alkyd Type.

1.02 SUBMITTALS

- A. Submit product data under provision of Section 013400 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Indicate profiles, sizes, connections, attachments, reinforcing, anchorage, size and type of fasteners and accessories.
- C. Include erection drawings and applicable details.
- D. Submit product data and installation instructions for each type of framing and accessories.

1.03 DELIVER, STORAGE AND HANDLING

- A. Store materials to prevent damage and to comply with manufacturer's recommendations.
- B. Keep steel members off ground using pallets, platforms, and other supports. Product steel members and packaged materials from corrosion and deterioration.

PART 2PRODUCTS

2.01 MANUFACTURERS

- A. Dale Industries/Incor.
- B. Roll Form Products, Inc.
- C. Knoor Steel Framing Systems
- D. Substitutions: Under provisions of Section 016300 PRODUCT OPTION AND SUBSTITUTIONS.

2.02 FRAMING MATERIALS

- A. Studs: ASTM A446 sheet, formed to channel shape, punched web, knurled faces; 16 ga. unless otherwise indicated; sizes indicated, galvanized.
- B. Track: ASTM A446, Grade A sheet steel, formed to channel shape, same width as studs, tight fit; 16 ga. unless otherwise indicated; solid web, galvanized.

2.03 ACCESSORIES

- A. Bracing, Furring and Bridging: Formed sheet steel, 16 ga., sizes indicated or if not indicated, as otherwise required for conditions encountered; manufacturer's standard shapes, galvanized.
- B. Plates, Gussets, Clips: Formed sheet steel, 16 ga., sized indicated or if not indicated, as otherwise required for conditions encountered; manufacturers standard shapes galvanized.

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2.04 FASTENERS

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts and Washers: Size suitable for thickness of metal being fastened, and type suitable for condition of use; hot dip galvanized per ASTM A153, A90, or equal.
- B. Lag bolts: Square head type, FS FF-B-561.
- C. Wood screws: Flathead carbon steel, FS FF-S-111.
- D. Machine washers: Cadmium plated steel, FS FF-S-92.
- E. Plain washers: Round carbon steel, FS FF-S-92.
- F. Lock washers: Helical spring type carbon steel, FS FF-W-84.
- G. Expansion bolts: Use Diamond "Di-Ex" machine bolts anchors, Parabolt "Drop-In" or Phillip's "Red Head" wedge type anchors in concrete. Use sleeve type anchors in masonry; similar and equal to Diamond "Sup-R-Sleeve", Hilti "Sleeve Anchors" or Phillip's "Red Head Sleeve Anchor".
 - 1. Use powder driven studs and pins only where load is acting in shear on anchor (parallel with surfaces), where there is no possibility of anchor's withdrawal, and where structural stability and strength are not impaired.
 - 2. Provide anchors to resist vibration, leverage, and shock as conditions require.
 - 3. Use anchors having ultimate holding capacity in direction of applied load, based on manufacturer's published literature, equal to 4 times load to be supported. Furnish anchors backed by certified test data.
- H. Welding Materials: AWS D1.1; type required for materials being welded.
- I. Touch-up Primer for Galvanized Surfaces: FS TT-P-645.
- J. Protective Coating: Non-fibrated asphalt coating, conforming to ASTM D1187, Type A.

2.05 FINISH

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Galvanizing: G60 coating class.
- C. Primer: FS TT-P-645, touch-up for galvanized surfaces.

PART 3 EXECUTION

- 3.01 PREPARATION
 - A. Do not proceed until conditions detrimental to work of this Section have been corrected.
 - B. Clean and strip site primed steel items to bare metal where site welding is scheduled.

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3.02 ERECTION OF STUDDING

- A. Install components in accordance with manufacturer's instructions.
- B. Align top and bottom tracks; locate to wall and partitions layout. Secure in place with fasteners or welding at maximum 24 in o.c.
- C. Place components at spacing indicated; not more than 2 in. from abutting walls and corners, and at each side of openings. Connect studs to tracks using clips and ties, screws or welding, in accordance with manufacturer's instructions.
- D. Construct corners using minimum three studs. Double studs at openings.
- E. Erect studs one piece full length. Splicing of studs is not permitted.
- F. Install intermediate studs above and below openings to match wall stub spacing.
- G. Attach cross studs to studs for attachment of fixtures anchored to walls.
 - 1. Supporting loads up to 100 lbs. per ft.: Minimum 6 x 1-1/4 in. long 16 ga. tracks notched around and welded to each minimum 16 ga. vertical stud each side. Weld tracks to studs all around with 1/16 in. fillet welds.
 - 2. Supporting loads up to 200 lbs. per ft. : Minimum 3 5/8 x 1 1/4 in. x 14 in. long 16 ga. track channel stiffeners welded to inside face of 6 in. x 14 ga. backing plates spanning min. two studs. Composite backing plates attached to each minimum 16 ga. vertical stud with #10 flat head sheet metal screw at midheight of plate. Weld tracks to plates with three 1/16 in. fillet welds, two in. long, ea. side of plate.
- H. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- I. Touch-up field welds and damaged galvanized surfaces with primer.
- J. Assure Framing provides true and flat surfaces, ready to receive finish.

3.03 ERECTION OF JOISTS

- A. Install framing components in accordance with manufacturer's instruction.
- B. Set joists parallel and level, with lateral bracing as required.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/8 in. in 10 ft., in any direction.
- B. Maximum Variation of any Member from Plane: 1/8 in.

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SECTION 06 01 00 LUMBER

PART 1 GENERAL

- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Materials required under this section include, but are not necessarily limited to all wood, plywood, nails, bolts, framing anchors and other hardware, and all other materials or items needed for rough and finish carpentry, but not specifically described in other sections.
 - B. Related Work Described Elsewhere:
 - 1. Rough Carpentry: Section 061000
 - 2. Shop-Fabricated Wood Trusses Section 061753

1.02 QUALITY ASSURANCE In addition to complying with applicable codes and regulations, comply with the following standards:

- A. Lumber Grading Rules and Wood Species to be in conformance with ANSI/AF&PA NDS-1997.
- B. Grading rules of the following associations apply to materials furnished under this Section.
 - 1. West Coast Lumber Inspection Bureau (WCLB).
 - 2. American Plywood Association (APA).
- C. Grade marks of the above association shall appear on all wood products furnished under this section.
- D. Regulatory Agencies:
 - 1. International Building Code (IBC) published by the International Conference of Building Officials.
 - 2. Lumber Treatment:
 - a. Preservative treatment of lumber and plywood: American Wood Preserves Bureau Standards. (AWPB)
 - b. Fire retardant treatment of lumber and plywood: American Wood Preserves Bureau Standards. (AWPB)
- E. Referenced Standards:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. American Wood Preserves Bureau (AWPB)

- a. AWPB LP-2 Standard for Softwood Lumber, timber and plywood treated with Waterbone Preservatives for above ground locations.
- 3. American Forest and Paper Association
 - a. ANSI/AF&PA NDS-1997.
- 4. American Institute of Timber Construction (AITC)

1.03 SUBMITTALS

Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections:

- A. Materials List: A complete list of all the types of materials proposed to be furnished under this section.
- PART 2 PRODUCTS
- 2.01 GRADE STAMPS
 - A. Framing Lumber: Identify all framing lumber by the grade stamp of the West Coast Lumber Inspection Bureau.
 - B. Plywood: Identify all plywood by the grade of the American Plywood Association.
 - C. Other: Identify all other products by the grade stamp of the appropriate grading agency for that particular product.

2.02 DIMENSION LUMBER

- A. Material:
 - 1. Provide kiln dried dimension lumber of the species and grade noted on the Drawings with not more than 19% moisture content, and complying with the dry size requirements of the appropriate grading agency.
 - 2. Dress dimension lumber s4s unless otherwise specifically called out.
- B. Appearance:
 - 1. Where framing lumber will be exposed to view and is shown or scheduled to receive a transparent or natural finish, provide lumber of "Appearance" grade.
- C. Pressure Treated:
 - 1. Provide where wood is in contact with masonry or concrete, or where noted on drawings. Cut ends to be treated with Ammoniacal Copper Arsenate (ACA) to a retention of 0.60 pcf per UBC Standard 25-12 and American Wood Preserves Bureau AWPB "FDN".
- 2.03 PLYWOOD

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Α.	Rough Carpentry:	

1. Provide interior type with exterior glue of the grade and type indicated on the Drawings.

Β. Appearance:

Where plywood will not be concealed by other work, provide A-B plugged grade with 1. 'A' side showing unless otherwise noted.

2.04 **ORIENTED STRAND BOARD SHEATHING**

Α. 7/16" STRUCTURAL 1 panels with exterior glue.

2.05 SOFFIT BOARDS

T-111 plywood, 5/8" thick. Class 303-18, 303-18 W Grade. Α.

2.06 **FASCIA BOARDS**

Α. Provide "Hardiplank" 1 x 4 and 1 x 8 fascia board and 7/16" hardipanel siding. James Hardie Building Products, 1-800-9-HARDIE

2.07 MISCELLANEOUS MATERIALS

Anchorage and Fastenings: Α. Select proper type, size, material, and finish for each application. Comply with the following:

1.	Nails and staples:	FS FF-N-105
2.	Tacks:	FS FF-N-103
3.	Wood screws:	FS FF-N-111
4.	Bolts and studs:	FS FF-B-575
5.	Nuts:	FS FF-B-836
6.	Washers:	FS FF-W-92
7.	Lag bolts:	FS FF-B-561
8.	Toggle bolts:	FS FF-B-588
9.	Bar or strap anchors:	ASTM A-575

PART 3 **EXECUTION**

3.01 **PRODUCT HANDLING**

- Storage and Protection: Α.
 - 1. Do not deliver any of the products of this section to the jobsite until a secure, dry. sheltered area, away from traffic, is available for their storage. Use all means necessary to protect the products of this section before, during, and after installation and to protect the installed materials and work of all other trades.
- Β. Repairs and Replacement:
 - In the event of damage make all repairs and replacements necessary to restore the 1. item to original undamaged condition. Repairs and replacements shall be subject to

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approval of the Architect and shall be accomplished at no additional expense to the Owner.

- C. Damaged Material:
 - 1. Segregate all damaged material to ensure against its incorporation into the Work, until all necessary repairs, where authorized, have been accomplished.
- D. Stockpiling:
 - 1. Stockpile all materials sufficiently in advance to ensure their availability in a timely manner for the work of all related sections.
- E. Compliance:
 - 1. Do not permit non-complying materials to be delivered to the jobsite and immediately remove any which are delivered, replacing them with materials complying with the requirements of this section.

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SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rough carpentry work, including but not limited to the following:
 - 1. Exterior and interior wood wall framing and sheathing
 - 2. Roof Fascia and Overbuild
 - 3. Miscellaneous furring and stripping for wall finishes
 - 4. In wall wood blocking for support of accessories.
- B. Coordination with appropriate sections of all requirements for backing and blocking.
- C. Related Work Described Elsewhere:
 - 1. Finish Carpentry: Section 062000

1.02 REFERENCES

- A. SPIB Southern Pine Inspection Bureau.
- B. WCLIB West Coast Lumber Inspection Bureau.
- C. WWPA Western Wood Products Association.
- D. APA American Plywood Association.
- E. AWPA American Wood Preservers Association.
- F. AWPB American Wood Preservers Bureau
- G. PS 1 Construction and Industrial Plywood.
- H. PS 20 American Softwood Lumber Standard.
- I. N.F.P.A. National Design Specification for Wood Construction.

1.03 QUALITY ASSURANCE

A. All wood materials to bear a visible grade stamp, of agency certified by National Forest Products Association (N.F.P.A.).

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store in weather protected, ventilated areas with a constant, minimum temperature of 60 degrees F maximum relative humidity of 25 to 55 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Dimensions: Specified dimensions are nominal, actual dimensions to conform to PS 20.
- B. Surfacing: Surface four sides (S4S), unless specified otherwise.

- C. Lumber: Provide new, sound and thoroughly seasoned lumber conforming to requirements of PS 20; graded in accordance with established Grading rules; fire retardant treated if required by code; of following species and grades:
- D. Non-Structural Light Framing (less than 2 in thick): Hem-Fir (WCLIB or WWPA), SPF (WWPA) or Southern Pine kiln dried (SPIB); moisture content 19% maximum at time of dressing "S-DRY", or 15% maximum "MC-15" or "K-D"; graded as follows:
 - 1. General framing: No. 2 & Better.
 - 2. Plates, blocking, curbs, and nailers:
 - a. Up to 2 x 4 in. No. 2 & Better
 - b. Over 2 x 6 in. No. 2 & Better.
 - 3. General utility purposes: No. 2 & Better.
- E. Softwood Plywood/Sheathing: Conform to requirements of PS-1. Provide panels bearing appropriate APA grade, and trade mark. Provide exterior grade plywood where any face or edge is exposed to the weather.
 - 1. Equipment Backing Panels: Plywood, APA B-C EXT, Plugged, Exterior glue; identification index Group 2; fire-retardant treated if required by code; 5/8 in. min thickness or as shown on plans.
 - 2. Wall Wainscot Panels: APA B-C EXT., Plugged, Exterior glue; identification index Group 2; fire-retardant treated if required by code; 3/4" min. thickness or as shown on plans.
 - F.R.T. Plywood: (location—200-series room interior non-load-bearing partitions.) Plywood, APA B-C EXT, Plugged, Exterior glue, identification index Group 2; Fire Retardant Treated, 5/8 inch thick or as shown on plans. Pressure-treated kiln-dried fire retardant product, type: FR-S. Basis of design: Boise Cascade, Hoover Treated Wood Products, "Exterior Fire-X" F.R.T. plywood.
- F. Nails, Spikes and Staples: Galvanized or zinc-coated for unheated locations, high humidity locations and treated wood; plain finish for other interior locations; size and type to suit application and in accordance with manufacturer's recommendations.
- G. Bolts, Nuts, Washers, Lags, Pins and Screws: Medium carbon steel; sized to suit application and in accordance with manufacturer's recommendations; galvanized or zinc-coated for unheated locations, high humidity locations and treated wood; plain finish for other interior locations.
- H. Joist Hangers and Framing Accessories: Simpson Company or prior approved equal, sized and profiled to suit application and in accordance with manufacturer's recommendations; galvanized finish.
- I. Fasteners: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolts or power activated type for anchorage to steel.
- J. Building Paper: ASTM D336, 15 lb. asphalt felt.
- K. Power Driven Fasteners:
 - 1. Pnuetek, Inc.: Pneumatically driven fastener with .143" shank diameter, .315" head diameter, and .073" head thickness installed with 1-1/2" wide 18 gauge galvanized

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steel strap, ICBO #3447. Contact local Pnuetek representative or Pnuetek, Inc.; Hudson, NH.; 603/883-1660.

2. Hilti: "DN" powder driven fastener with 1-7/16" diameter by .060" thick washer, ICBO #2388.

2.02 ACCESSORIES

- A. Dust and Vapor Barrier (07210): reinforced flame retardant polyethylene sheets, 6 mil minimum thickness.
- B. Polypropylene Vapor Barrier Tape (07210): Flame retardant self-adhering type, 2" wide.

2.03 PRESERVATIVE TREATMENT

- A. Shop pressure treat and deliver to site ready for installation.
- B. Wood Preservative (Pressure Treatment): Apply in conformance with AWPA Standard P5, using water-borne preservatives complying with AWPA Standard C27-93, ASTM D2898-94 and ASTM D3201-94. After treatment, kiln-dry to maximum moisture content of 15%.
 - 1. Apply treatment complying with AWPA Standard C2.

2.04 FIRE RETARDANT TREATMENT

- A. Factory treat and deliver to site ready for installation, wood materials requiring UL fire rating. Provide UL approved identification on treated materials.
- B. Comply with the applicable AWPA Standard as follows:
 - 1. Plywood: AWPA Standard U1, Doug Fir sheathing, UL data: BUGV R7003, Exterior Type (at interior rooms).

PART 3 EXECUTION

3.01 BLOCKING

- A. Fasten wood blocking to framing with fasteners capable of withstanding loads to be applied to blocking. Install blocking for support of items as required.
- B. Install continuous pieces of longest possible lengths, cut to fit and fully bearing on framing.
- 3.02 ROOF RELATED WOOD BLOCKING
 - A. Anchor blocking to metal decking and framing as detailed with 1/2" bolts set a maximum of 4'-0" o.c.
 - B. Where blocking is more than 6" wide, anchor with 1/2" bolts set at 2'-6" o.c. and stagger alignment.
 - C. Where blocking is required on roof deck, build-up, shim, or cut as required to set top of blocking flush with the top of the adjacent insulation.
 - D. Cover wood blocking with temporary waterproof covering until permanent flashing is installed.

3.03 PLYWOOD SHEATHING

A. Install with face grain perpendicular to direction of framing.

- B. Allow minimum space 1/16" between end joints and 1/8" at edge joints for expansion and contraction of panels; double these spaces under wet or humid conditions.
- C. Fasten per structural drawings or minimum of 6" o.c. along panel edges and 12" o.c. at intermediate supports with non-corrosive nails.
- D. Install telephone and electrical panel backboards with plywood sheathing material where required.

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SECTION 06 17 53

SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Definition:

Fabricated wood trusses include but are not necessarily limited to planar structural units consisting of metal plate connected members which are fabricated from dimension lumber. All which have been cut and assembled prior to delivery to the job site. Types of fabricated wood trusses include:

- 1. Top chord and bottom chord, edge bearing, wood trusses per drawings.
- B. Related work described elsewhere:
 - 1. Lumber: Section 060100
 - 2. Rough Carpentry: Section 061000

1.02 QUALITY ASSURANCE

- A. Truss design standard:
 - 1. Design of all trusses shall meet the dimensions and loads indicated on the plans. All designs shall be in accordance with standard engineering practice and the Design Specification for Metal Plate Corrected Wood Trusses published by the Truss Plate Institute (TPI). Complete design calculations showing member forces and stresses and allowable load shall be furnished for each truss design. The design and fabrication of the trusses shall be under the supervision of a professional engineer, registered to practice in the State of Alaska.
- B. Wood structural design standard:
 - 1. ANSI/AF&PA NDS-1997.
- C. Grading of lumber:
 - 1. Provide lumber graded by a recognized agency, with rules and service complying with requirements of American Lumber Standards Committee and PS 20. Use only lumber pieces which bear inspection service's grade mark, unless otherwise indicated. (Remove mark during fabrication if necessary.)
- D. Truss fabrication standard:
 - 1. Quality Control Manual published by TPI. Trusses shall be manufactured in a plant approved by the local building official.
- E. Fabricator's qualifications:
 - 1. Minimum of 3 years experience in successful fabrication of trusses comparable to type indicated for this project.

1.03 SUBMITTALS

- A. Product data:
 - 1. Submit fabricator's specifications and installation instructions for required work, covering lumber, metal plates, hardware, fabrication process, treatment (if any), handling and erection.
 - 2. Submit certification, signed by an officer of fabricating firm, indicating that trusses to be supplied for project comply with indicated requirements.
- B. Shop drawings:
 - 1. Submit shop drawings showing species, sizes and stress grades of lumber to be used; pitch, span, camber configuration and spacing for each type of truss required; type, size, material, finish, design value, and location of metal connector plates; and bearing and anchorage details.
 - 2. To the extent engineering design considerations are indicated as fabricator's responsibility, submit design analysis and test reports indicating loading, section modulus, assumed allowable stress, stress diagrams and calculations, and similar information needed for analysis and to ensure that trusses comply with requirements.
 - 3. Provide shop drawings which have been signed and stamped by an engineer licensed to practice in the State of Alaska.

1.04 DELIVERY, STORAGE, HANDLING

- A. Handle and store trusses with care, and in accordance with manufacturer's instructions and TPI recommendations to avoid damage from bending, overturning or other cause for which truss is not designed to resist or endure.
- B. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying work of other trades whose work must follow erection of trusses.

PART 2 PRODUCTS

- 2.01 MATERIALS
 - A. Lumber:
 - 1. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide seasoned lumber with 19% maximum moisture content at time of dressing.
 - 3. Lumber grade: For species used, comply with WWPA No. 1 stress-rated grade.
 - B. Metal connector plates, fasteners and anchorages:
 - 1. Connector plate material:

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Metal complying with following requirements, unless otherwise indicated; not less than "0.036" thick, coated thickness at the Contractors option.

- a. Galvanized sheet steel: ANSI/ASTM A 446, Grade A, Coating G60.
- b. Electrolytic zinc coated steel sheet: ANSI/ASTM A 591, Coating Class C, with minimum structural quality equivalent to ANSI/ASTM A 446, Grade A.
- c. Stainless steel: ANSI/ASTM A 167, Type 304, with minimum structural quality equivalent to ANSI/ASTM A 446, Grade A.
- C. Fasteners and anchorage:
 - 1. Provide size, type, material and finish indicated, complying applicable Federal Specifications for nails, screws, bolts, nuts and washers and anchoring devices.

2.02 FABRICATION

- A. Cut truss members to accurate lengths, angles and sizes to produce close fitting joints with proper wood-to-wood bearing in assembled units.
- B. Fabricate metal connector plates to proper size, configuration, thickness and anchorage details required for types of joint designs indicated.
- C. Connect truss members by means of metal connector plates accurately located and securely fastened to wood members by means indicated or approved.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Erect and brace trusses to comply with recommendations of manufacturer and the Truss Plate Institute.
- B. Erect trusses with plane of truss webs vertical (plumb) and parallel to each other, located accurately at design spacings indicated.
- C. Hoist units in place by means of proper lifting equipment suited to sizes and types of trusses required, applied at proper lift points as recommended by fabricator, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Provide temporary bracing as required to maintain trusses plumb, parallel and in proper location, until permanent bracing is installed.
- E. Anchor trusses securely at all bearing points to comply with methods and details indicated.
- F. Install permanent bracing and related components to enable trusses to maintain design spacing, withstand live and dead loads including lateral loads, and to comply with other indicated requirements.

G. Do not cut remove, or otherwise alter truss or truss members.

SECTION 06 20 00

FINISH CARPENTRY

PART 1 GENERAL

DESCRIPTION 1.01

- Α. Work Included:
 - 1. Finish carpentry items, other than shop prefabricated casework.
 - 2. Hardware and attachment accessories.
 - 3. Refer to schedule at end of this Section
- Β. Related Work Described Elsewhere:
 - 1. Hollow Metal Doors and Frames
 - 2. Door Hardware
 - 3. Glazing
 - 4. Painting
 - 5. Modular Casework
- C. REFERENCES
 - 1. ANSI/HPHA HP American Standard for Hardwood and Decorative Plywood.
 - 2. ANSI A135.4 Basic Hardboard
 - 3. AWI Quality Standards.
 - 4. FS MM-L-736 Lumber; Hardwood.
 - 5. FS MMM-A-130 Adhesive, Contact.
 - NEMA LD-3 High Pressure Decorative Laminates. 6.
 - PS 1 Construction and Industrial Hardwood. 7.
 - 8. PS 20 American Softwood Lumber Standard.
 - 9. UL Underwriters Laboratories.

1.02 SUBMITTALS

- Α. Submit shop drawings in accordance with Section 013400.
- Β. Submit shop drawings indicating material, component profiles, fastening methods, jointing details, finishes, accessories, and hardware to a minimum scale of 1-1/2 in. to one ft.
- C. Submit product data under provisions of Section 013400.
- D. Submit product data on hardware.

DELIVERY, STORAGE AND HANDLING 1.03

- Deliver products to site under provision of Section 016100. Α.
- Β. Store and protect products under provisions of Section 016200.
- C. Store materials in ventilated, interior locations under constant minimum temperatures of 60 degrees F and maximum relative humidity of 55 percent.

PART 2 PRODUCTS

DIVISION 06 SECTION 06 20 00 FINISH CARPTENTRY

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- Section 099000

Section 123020

Section 081110 Section 087000 Section 088000

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2.01 LUMBER MATERIALS

- A. Softwood Lumber: PSA 20; Douglas Fir, Quality Grade II in accordance with AWI, maximum moisture content of 8 percent.
- B. Softwood Lumber: 2 x 8 appearance grade Spruce Pine Fir (SPF), maximum moisture content of 9 percent.
- C. Hardwood Lumber: Quality Grade I in accordance with AWI; maximum moisture content of 8 percent; Birch Select Grade, with plain sawn grain, of quality capable of transparent finish.

2.02 SHEET MATERIALS

- A. Softwood Plywood: PS 1; Standard Sheathing Grade, Group 1, BD Appearance Quality; Douglas Fire species, with face veneer of rotary cut grain. Hardwood Plywood: Hickory Select Grade veneer AB appearance.
- B. MDO 4 x 8 x 5/8": Paint Grade 1 side at interior of Apparatus bays.
- C. Wood Particleboard: Composed of wood flakes made with waterproof resin binders of 45 lbs. per cu. ft. density; sanded faces.
- D. Hardboard: ANSI A135.4 pressed wood fiber with resin binder; tempered grade.
- E. Stainless Steel: Heavy Gauge Type 304.

2.04 ACCESSORIES

- A. Nails: Size and type to suit application, galvanized finish.
- B. Bolts, Nuts, Washers, Blind Fasteners, Lags and Screws: Size and type to suit application, galvanized finish.
- C. Primer: Alkyd primer sealer type.
- D. Wood Filler: Solvent or Oil base, tinted to match surface finish color, compatible with finish system specified in Section 099000.
- E. Plastic Edge Trim: Heavy duty extruded 2mm PVC, applied with waterproof hot-melt adhesive; 1/8 in. radius, all corners. Color as selected.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and openings are ready to receive work and field measurements are as shown on shop drawings.
- B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.
- C. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

A. Before installation, prime paint surfaces of items or assemblies to be contact with cementitious materials.

3.03 INSTALLATION

- A. Install work in accordance with AWI Custom quality standard.
- B. Set and secure materials and components in place, plumb and level.
- C. Install components with finish nails, screws or bolts; with blind fasteners at 16 in. on center whenever possible, and wall adhesive by gun application. Set all surface nails.
- D. Unless otherwise indicated, cover exposed edges of plywood and particle board shelving and site made casework with pvc edging applied with hot melt adhesive. Width of edging to match thickness of shelving. Color selected.
- E. Apply plastic laminate finishes where indicated. Adhere with adhesive over entire surface. Make joints and corners hairline. Match patterns. Slightly bevel arises. Cap exposed edges with plastic laminate of same finish and pattern. Apply laminate backing sheet on reverse side of plastic laminate finished surfaces.
- F. Install hardware in accordance with manufacturer's instructions.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/16 in.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 in.
- 3.05 PREPARATION FOR SITE FINISHING
 - A. Set exposed fasteners. Apply wood filler in exposed fastener indentation. Sand work smooth.
 - B. Painting: Refer to Section 099000.

3.06 PROTECTION

A. Protect finished installation under provisions of Section 015000.

3.07 SCHEDULE

- A. Interior:
 - 1. Molding and Miscellaneous Trim: Hardwood lumber, kiln-dried, surfaced 4 sides and worked to patterns shown or specified, painted as specified under Section 09900.
 - 2. Other Finish Carpentry Work: As shown, and/or specified, and similar to items scheduled above.

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SECTION 06 65 10 SOLID SURFACE FABRICATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following horizontal and trim solid surface product types:
 - 1. Countertops with sinks
 - 2. Transaction Counters
 - 3. Countertops
- B. Related Sections include the following:
 - 1. Division 6 Section 061000 "Rough Carpentry" for Blocking.
 - 2. Division 22 Section 224000 "Plumbing Fixtures."
 - 3. Division 26 Section 262726 "Wiring Devices."

1.03 DEFINITION

A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.04 SUBMITTALS

A. Product data:

1. For each type of product indicated.

B. Shop drawings:

1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.

a. Show full-size details, edge details, thermoforming requirements, attachments, etc.

b. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.

c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.

C. Samples:

1. For each type of product indicated.

- a. Submit minimum 6-inch by 6-inch sample in specified gloss.
- b. Cut sample and seam together for representation of inconspicuous seam.
- c. Indicate full range of color and pattern variation.
- 2. Approved samples will be retained as a standard for work.
- D. Product data:

1. Indicate product description, fabrication information and compliance with specified performance requirements.

F. Product certificates:

1. For each type of product, signed by product manufacturer.

G. Fabricator/installer qualifications:

1. Provide copy of certification number.

- H. Manufacturer certificates:
 - 1. Signed by manufacturers certifying that they comply with requirements.
- I. Maintenance data:
 - 1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
 - a. Maintenance kit for finishes shall be submitted.
 - 2. Include in project closeout documents.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

B. Fabricator/installer qualifications:

1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

- C. Applicable standards:
 - 1. Standards of the following, as referenced herein:
 - a. American National Standards Institute (ANSI)

- b. American Society for Testing and Materials (ASTM)
- c. National Electrical Manufacturers Association (NEMA)
- d. NSF International
- 2. Fire test response characteristics:

a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:

- 3. Flame Spread Index: 25 or less.
- 4. Smoke Developed Index: 450 or less.
- D. Coordination drawings:
 - 1. Shall be prepared indicating:
 - a. Plumbing work.
 - b. Electrical work.
 - c. Miscellaneous steel for the general work.

d. Indicate location of all walls (rated and non-rated), blocking locations and recessed wall items, etc.

- 2. Content:
 - a. Project-specific information, drawn accurately to scale.

b. Do not base coordination drawings on reproductions of the contract documents or standard printed data.

c. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.

d. Provide alternate sketches to designer for resolution of such conflicts.

3. Minor dimension changes and difficult installations will not be considered changes to the contract.

- E. Drawings shall:
 - 1. Be produced in 1/2-inch scale for all fabricated items.

F. Drawings must be complete and submitted to the architect within 60 days after award of contract for record only.

1. No review or approval will be forthcoming.

2. Coordination drawings are required for the benefit of contractor's fabricators/installers as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.

G. Job mock-up:

1. Prior to fabrication of architectural millwork, erect sample unit to further verify selections made under sample submittals and to demonstrate the quality of materials and execution.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage to finished surfaces.

1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.07 WARRANTY

- A. Provide manufacturer's warranty against defects in materials.
 - 1. Warranty shall provide material and labor to repair or replace defective materials.

2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

1.08 MAINTENANCE

A. Provide maintenance requirements as specified by the manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:
 - 1. Subject to compliance with requirements, provide products by one of the following:
 - a. Corian® surfaces from the DuPont company (basis of design).
 - b. Substitutions: Under provisions of Section 016300.

2.02 MATERIALS

A. Solid polymer components

1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.

2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.

- B. Thickness: 1/2 inch
- C. Edge treatment:
 - 1. 1/8" eased edge at 90 degree outside edges per architectural drawings.
 - 2. Knife edge typical per architectural drawings.
- D. Mounting: Seamed undermount.
- E. Color: Samples shall be provided to architect for selection. A separate color shall be provided for each solid surface type shown in the drawings. (Example: SS1, SS2)
- F. Performance characteristics:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5 x 10 ⁻⁶ psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2 x 10 ⁻⁶ psi	ASTM D 790
Hardness	>85	Rockwell "M"
		Scale
		ASTM D 785
	56	Barcol Impressor
		ASTM D 2583
Thermal Expansion	3.02 x 10⁻⁵ in./in./°C	ASTM D 696
	(1.80 x 10⁻⁵ in./in./°F)	
Gloss (60° Gardner)	5–75 (matte—highly polished)	ANSI Z124
Light Resistance	(Xenon Arc) No effect	NEMA LD 3-2000
-		Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 &
-		Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 &
		Z124.6
Fungus and Bacteria Resistance	No support for microbial growth	ASTM G21&G22
Boiling Water Resistance	No visible change	NEMA LD 3-2000
C C	C C	Method 3.5
High Temperature Resistance	No change	NEMA LD 3-2000
	-	Method 3.6
Izod Impact	0.28 ftlbs./in. of notch	ASTM D 256
(Notched Specimen)		Method A)
		Method A)
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Ball Impact	No fracture—1/2 lb. ball:	NEMA LD 3-2000
Resistance: Sheets	1⁄4" slab—36" drop	Method 3.8
	1/2" slab—144" drop	
Weatherability	∆E* ₉₄ <5 in 1,000 hrs.	ASTM G 155
Specific Gravity †	1.7	
Water Absorption	Long-term	ASTM D 570
	0.4% (3⁄4")	
	0.6% (1/2")	
	0.8% (1⁄4")	
Toxicity	99 (solid colors)	Pittsburgh Protocol
2	66 (patterned colors)	Test ("LC50"Test)
Flammability	All colors	ASTM E 84.
,	(Class Land Class A)	NFPA 255 &
		UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

† Approximate weight per square foot: 1/4" (6 mm) 2.2 lbs., 1/2" (12.3 mm) 4.4 lbs. Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories. NEMA results based on the NEMA LD 3-2000

2.03 ACCESSORIES

A. Joint adhesive:

1. Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.

B. Sealant:

1. Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.

C. Sink/lavatory mounting hardware:

1. Manufacturer's standard bowl clips, panel inserts and fasteners for attachment of under mount sinks/lavatories.

D. Conductive tape:

1. Manufacturer's standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.

E. Insulating felt tape:

1. Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.04 FACTORY FABRICATION

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A. Shop assembly

1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.

2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.

a. Reinforce with strip of solid polymer material, 2" wide.

3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.

- 4. Rout and finish component edges with clean, sharp returns.
 - a. Rout cutouts, radii and contours to template.
 - b. Smooth edges.
 - c. Repair or reject defective and inaccurate work.WRI

2.05 FINISHES

- A. Select from the manufacturer's standard color chart.
 - 1. Color: Shall be selected from manufacturers color samples provided to the architect.
- B. Finish: Provide surfaces with a matte uniform finish.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
 - 1. Provide product in the largest pieces available.

2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.

a. Exposed joints/seams shall not be allowed.

3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.

- 4. Cut and finish component edges with clean, sharp returns.
- 5. Rout radii and contours to template.
- 6. Anchor securely to base cabinets or other supports.

7. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.

8. Carefully dress joints smooth, remove surface scratches and clean entire surface.

9. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.

3.03 REPAIR

A. Repair or replace damaged work which cannot be repaired to architect's satisfaction.

3.04 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.

END OF SECTION

SECTION 07 11 00 SHEET MEMBRANE WATERPROOFING

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 033000 Cast in Place Concrete
- B. Section 076200 Metal Flashing and Trim

1.02 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this Specification. The Publications may be referred to in the text by basic designations only. In case of conflict the most stringent shall apply.
 - 1. ASTM D146 Methods of Sampling and Testing Bitumen-Saturated Felts and Fabrics Used in Roofing and Waterproofing.
 - 2. ASTM D412 Test Methods for Rubber Properties in Tension.
 - 3. ASTM E96 Test Methods for Water Vapor Transmission of Materials.
 - 4. ASTM E154 Methods of Testing Materials for Use as Vapor Barriers under Concrete Slabs and as Ground Cover in Crawlspaces.

1.03 DESCRIPTION

A. Waterproofing system to provide continuous protection against water intrusion for below-grade concrete walls and floors.

1.04 SUBMITTALS

- A. Product Data: Indicate performance data, materials, recommended use, application instructions, substrate surface preparation, joints, penetrations, terminations and special curing requirements.
- B. Manufacturer and Installer qualifications.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum of five years experience manufacturing and supplying specified products. Also provide list of at least ten project references where specified product was used, including project name, telephone contact, location, date, and product usage.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not apply waterproofing at ambient temperatures or in conditions other than those recommended in writing by the manufacturer and in no case when temperatures are expected to be below 40 degrees F, in rain or snow, or with dirt, frost or water on surfaces to be coated.

1.07 WARRANTY

A. Manufacturer to warrant materials are free from defects for a period of five years after Substantial Completion.

B. Contractor to warrant installation, free from water leaks, for a period of one year after Substantial Completion.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. W.R. Grace, "Bituthene Low Temperature Waterproofing Membrane".

2.02 MEMBRANE WATERPROOFING

- A. Pre-manufactured, elastromeric, self-adhering sheet membrane waterproofing composed of high-strength polyethylene bonded to rubberized asphalt recommended by manufacturer for below grade application.
- B. Minimum Total Thickness: 0.060 inches (60 mil): 0.004 inch minimum thickness of highstrength polyethylene film, bonded 0.056 inch minimum thickness of rubberized asphalt.
- C. Water Permeance: 0.1 perm maximum per ASTM E96.
- D. Hydrostatic Head: To withstand 150 feet of water.
- E. Tensile Strength: 250 psi minimum per ASTM D412.
- F. Puncture Resistance: Forty pounds per ASTM E154.
- G. Pliability: 180 degree bend over 1 inch mandrel at 25 F per ASTM D146.

2.03 ACCESSORIES

A. Primers, adhesives, mastics, flashings, sealants, and other accessories necessary for a complete, water-tight application as recommended by membrane manufacturer.

2.04 PROTECTION BOARDS

A. Finish Floor to bottom of footings, protect with minimum 1" thickness of rigid insulation.

PART 3 – EXECUTION

3.01 INSPECTION OF SURFACES

- A. Examine surfaces to receive work for defects that will adversely affect the completed installation and for deviations beyond the allowable tolerances.
- B. Surfaces clean, dry, smooth, cured, and free from voids or projections that would damage or impair bond of membrane.
- C. Concrete to receive waterproofing shall be cured at fifty degrees to seventy degrees Fahrenheit for a minimum of seven days, per American Concrete Institute (ACI) 301, and dry before installation of waterproofing.
- D. Verify that mechanical and electrical penetrations are complete and ready for cover.

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E. Start of work means acceptance of the interfacing surfaces as capable of producing an acceptable job.

3.02 APPLICATION

- A. Complete and in accordance with the approved manufacturer's written recommendations for type of application proposed. Press out membrane with mechanical roller to minimize wrinkles and bubbles.
- B. Install to provide continuous, unbroken, waterproof envelope under floor, outside footings and up outside of walls.
- C. Seal substrate cracks and joints with membrane manufacture's recommended materials.

3.03 INSTALLATION

- A. Primer Application:
 - 1. Apply approved primer to clean sound concrete surfaces in accordance with manufacturer's recommendations.
 - 2. Allow primer to dry one house or until tack free.
 - 3. Prime only areas that will be covered with the membrane on the same day. Areas not covered within twenty-four hours shall be re-primed.
- B. Membrane Application:
 - 1. Apply continuously over cured concrete surfaces in accordance with manufacturer's recommendations. Lap joints to shed water.
 - 2. Apply membrane in double thickness at each control and construction joint, and lap six inches minimum.
 - 3. Vertical and horizontal terminations: press membrane firmly to concrete and apply a trowel bead of mastic to exposed edges.
 - 4. Lap edge and end seams three-inch minimum.
 - 5. Adhere membrane with heavy pressure to concrete surfaces without stretching.
 - 6. Slit and repair all fishmouths, with a patch lapped six inches in all directions. Seal with manufacturer approved adhesive.
 - 7. Corners: apply a double thickness of membrane at all corners. Inside corners shall have a two-inch minimum fillet of mastic.
 - 8. Apply a double layer of membrane projecting at least six inches around all floor drains and other floor, wall penetrations. Seal penetrations with mastic.
 - 9. Completed work shall be smoothly and completely adhered to concrete surfaces.
- C. Protection Board Installation:
 - 1. Adhere to membrane with approved adhesive to completely cover and protect the membrane.
 - 2. Install immediately after membrane installation.

3.04 SHEET MEMBRANE WATERPROOFING SCHEDULE

A. Concrete building elements below ground around basements, stairs to basements and mechanical ventways including a minimum five foot lap along adjacent walls. Install membrane against exterior of concrete basement walls and concrete mud slab under basement floors, lapping joints for continuous waterproofing between walls and floors.

3.05 PROTECTION BOARD SCHEDULE

A. Install protection board over all horizontal (floor) waterproofing, and over basement walls not covered by exterior foundation insulation.

END OF SECTION

DIVISION 07

SECTION 07 21 20

BOARD INSULATION

PART 1 GENERAL

- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Perimeter foundation wall insulation and below all snow-melt systems.
 - 2. Refer to schedule at end of this Section.
 - B. Related Work Described Elsewhere:
 - 1. Cast-In-Place Concrete Section 033000
 - 2. Concrete Unit Masonry Section 042300
 - 3. Vapor Retarder
 - 4. Batt and Blown-In Insulation
 - C. Reference Standards:
 - 1. American Society for Testing and Materials (ASTM):
 - a. C272-53 (1980) Water Absorption of Core Materials for Structural Sandwich Construction.

Section 072600

Section 072130

- b. C518-76 Steady State Thermal Transmission Properties by Means of the Heat Flow Meter.
- c. C578-85 Preformed, Cellular Polystyrene Thermal Insulation.
- d. D1621-73 (1979) Compressive Properties of Rigid Cellular Plastics.
- e. D2842-69 (1975) Water Absorption of Rigid Celular Plastics.

1.02 SYSTEM DESCRIPTION

A. Materials of this Section shall provide a continuous thermal barrier at building enclosure elements, in conjunction with insulation specified in Section 072130.

1.03 SUBMITTALS

A. Submit manufacturer's product data and installation instructions under provision of Section 013400.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS
 - A. The Dow Chemical Company
 - B. UC Industries
 - C. Western Insulfoam

2.02 INSULATION MATERIALS

- A. Extruded Rigid Insulation: ASTM C578, type VI extruded polystyrene, thickness shown, Styrofoam "SM" or Foamular "400".
 - 1. Minimum density: 2.0 pcf.
 - 2. Minimum compressive strength: 25 psi at 10 percent deformation or yield per ASTM D1621.
 - 3. Maximum water absorption: 1 percent by volume after 96 hr. soak test per ASTM D2842.
 - 4. Minimum aged 'R' value per one in. thickness: ASTM C518 5.0 at 75 degrees F.
 - 5. Provide 1" high-density below all snow-melted concrete.
- B. Expanded Rigid Insulation: ASTM C578, expanded cellular polystyrene, thickness shown, similar and equal to Western Insulfoam's "Insulfoam II".
 - 1. Minimum density: 2.0 pcf.
 - 2. Minimum compressive strength: 35 psi at 5 percent deformation or yield per ASTM D1621.
 - 3. Maximum water absorption: 1 percent by volume after 96 hr. soak test per ASTM D2842.
 - 4. Minimum 'K' value per ASTM C518: 0.22 at 75 degrees F.

2.03 ADHESIVE MATERIALS

A. Adhesive: As recommended by protection board manufacturer for application, and compatible with insulation and dampproofing materials.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify substrate and adjacent materials and insulation boards are dry and ready to receive insulation and adhesive.
- B. Verify substrate surface is flat, free of honeycomb, fins, irregularities, and materials that impede adhesive bond.
- C. Verify insulation boards are unbroken, free of damage and with surfaces intact.

3.02 INSTALLATION - EXTRUDED RIGID INSULATION

- A. Apply to inside face of foundation walls below grade in accordance with Drawings and manufacturer's instructions. Do not leave exposed to sunlight.
- B. Apply adhesive in three continuous beads per board length.

- C. Place boards by method to maximize contact bedding. Butt edges and ends tight to adjacent boards and to protrusions.
- 3.03 SCHEDULE

Location:

Interior Side of Perimeter Foundation Wall: Α.

Extruded Rigid or Expanded Rigid

- Β. Roofing: (Refer to Section 07 55 10)
- C. Provide board insulation at other locations as shown and as required to provide a continuous thermal barrier at the building enclosure elements and where not otherwise specified in Sections 072130 and 072140.

END OF SECTION

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NIKISKI FIRE STATION NO. 3

NIKISKI, ALASKA

Per Spec

Type:

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SECTION 07 21 30 BATT AND BLOWN-IN INSULATION

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Thermal insulation in exterior frame wall and attic construction.
 - 2. Sound Attenuation Batts Fiber Glass.
 - 3. Fiber Glass Loosefill Insulation.
 - 4. Batt insulation for filling perimeter window and door shim spaces, and crevices in exterior wall and roof assemblies.
 - B. Related Work Described Elsewhere:

Vapor Retarder	Section 072600
Board Insulation	Section 072120
Joint Sealants	Section 079000
Gypsum Wallboard	Section 092500
Acoustical Ceilings	Section 095110

C. References:

1.

2.

3.

4.

5.

American Society for Testing and Manufacturing (ASTM) :

- 1. C518-85 Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter.
- 2. C665-86 Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- 3. E84-87 Surface Burning Characteristics of Building Materials.

1.02 SYSTEM DESCRIPTION

A. Provide thermal barrier at building enclosure elements in conjunction with insulation specified in Section 072120, and vapor retarder materials in Section 071900.

1.03 SUBMITTALS

A. Submit manufacturer's product data and installation instructions under provision of Section 013400.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Owens Corning.
- B. Manville
- C. CertainTeed.

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K+A designstudios

2.02 INSULATION MATERIALS

- A. Fibrous Insulation:
 - 1. Thermal insulation: ASTM C665 unfaced, friction fit blanket. Thickness indicated, 1 lb. density.
 - 2. Minimum 'R' value per inch of thickness: 3 per ASTM C518.
 - 3. Flame Spread: 25 maximum per ASTM E84.
- B. Sound Attentuation Batts: Interior partition systems, metal frame construction 3 ½ x 89mm thickness. Complying with ASTM C 665, Type 1 and ASTM E 136.
- C. PINK Fiber Glass Loosefill Insulation, blown-in insulation, to provide an R value, at locations as shown on the drawings.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify adjacent materials are dry and ready to receive installation.
- B. Verify mechanical and electrical services within walls have been installed and tested.

3.02 INSTALLATION

- A. Install batt insulation in accordance with manufacturer's instructions.
- B. Install batt insulation in exterior wall spaces between framing members and elsewhere as indicated, without gaps or voids.
- C. Staple wall insulation at top to prevent sagging.
- D. Trim insulation neatly to fit spaces. Use batts free of damage.
- E. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.
- F. Stuff loose insulation into miscellaneous voids and cavity spaces as indicated. Compact to approximately 40 percent of normal volume.

END OF SECTION

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SECTION 07 21 40

FOAMED-IN-PLACE INSULATION

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Foamed-in-place insulation in exterior door frames and in crevices requiring thermal seal.
 - B. Related Work Described Elsewhere:

1.	Vapor Retarder	Section 072600
2.	Board Insulation	Section 072120
3.	Batt Insulation	Section 072130
4.	Joint Sealers	Section 079000
5.	Steel Doors and Frames	Section 081110

C. References:

American Society for Testing and Materials (ASTM) :

- 1. C177-76 Steady-State Thermal Transmission Properties by Means of the Guarded Hot-Plate
- 2. D1622-83 Apparent Density of Rigid Cellular Plastics
- 3. D2482-76 Wax Pick Test for Surface Strength of Paper
- 4. E84-84 Surface Burning Characteristics of Building Materials.
- 5. E96-80 Water Vapor Transmissions of Materials.
- 6. E119-83 Fire Tests of Building Construction and Materials.

1.02 REGULATORY REQUIREMENTS

- A. Conform to Uniform Building Code for flame/fuel/smoke and concealment requirements.
 - 1. Flame spread: Less than or equal to 75, per ASTM E84.
 - 2. Smoke Developed Rating: Less than or equal to 450, per ASTM E84.
 - 3. Separate building interior from foam insulation by a thermal barrier having an index of 15 or more, when tested in accordance with ASTM E119.

1.03 SUBMITTALS

- A. Submit product data and manufacturer's installation instructions under provision of Section 013400.
- B. Include product description, insulation properties and preparation requirements.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Do not install insulation when ambient temperature is lower than 70 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

PAGE 2 OF 2

A.	Insta-Foam Products. Inc.	Product:	Froth-Pak
В.	Reichold	Product:	34-841
C.	Upjohn-CPR Div	Product:	CPR-832-3

2.02 INSULATION MATERIALS

- A. Insulation: Polyurethane or Isocyanurate type.
- B. Thermal Conductivity; per ASTM C177:
 - 1. 0.17 'K' value when aged 90 days at 140 degrees F.
 - 2. Water vapor transmission: ASTM E96; 3.0 perm-in.
 - 3. Water vapor absorption: 3 percent by volume after 24 hrs. 100 percent RH, maximum per ASTM D2842.
 - 4. Density: ASTM D1622; minimum 2 lb/cu ft.
 - 5. Fire Hazard Class: ASTM E84; 25/450 max.

2.03 INSULATION ACCESSORIES

- A. Primer: As required by insulation manufacturer.
- B. Sealant: Silicone, as specified in Section 079000.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.
- B. Verify work within walls is complete prior to insulation application.

3.02 PREPARATION

- A. Mask and protect adjacent surfaces from overspray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

3.03 INSULATION APPLICATION

- A. Apply insulation in accordance with manufacturer's instructions.
- B. Be cautious of flammability of insulation during and after installation.
- C. Apply insulation by froth or pour method.
- D. Apply insulation to a uniform monolithic density without voids.

END OF SECTION

07 21 40 - 2

WEATHER BARRIER

SECTION 07 25 00 PART 1 - GENERAL

ART I SERENAE

- 1.1 SECTION INCLUDES
 - A. Weather barrier membrane
 - B. Seam Tape
 - C. Flashing

1.2 REFERENCES

- A. ASTM International
 - 1. ASTM C920; Standard Specification for Elastomeric Joint Sealants
 - 2. ASTM C1193; Standard Guide for Use of Joint Sealants
 - 3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
 - 4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
 - 5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
 - 6. ASTM E96; Test Method for Water Vapor Transmission of Materials
 - 7. ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls
 - 8. ASTM E2178; Test Method for Air Permeance of Building Materials
 - 9. ASTM E2357; Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- B. AATCC American Association of Textile Chemists and Colorists
 - 1. Test Method 127 Water Resistance: Hydrostatic Pressure Test
- C. TAPPI
 - 1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
 - 2. Test Method T-460; Air Resistance (Gurley Hill Method)

1.3 SUBMITTALS

- A. Refer to Section 01 34 00 Shop Drawings, Product Data and Samples
- B. Product Data: Submit manufacturer current technical literature for each component.
- C. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.
- D. Quality Assurance Submittals
 - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
 - 2. Manufacturer Instructions: Provide manufacturer's written installation instructions.
 - 3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.
- E. Closeout Submittals
 - 1. Refer to Section 01 780 00 Closeout Submittals

2. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion.

1.4 QUALITY ASSURANCE

- A. Qualifications
 - 1. Installer shall have experience with installation of weather barrier assemblies under similar conditions.
 - 2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
 - 3. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 01 62 00 Storage and Protection.
- B. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store weather barrier materials as recommended by weather barrier manufacturer.

1.6 SCHEDULING

- A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.
- B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. DuPont; 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805; 1-800-44-TYVEK (8-9835); http://www.construction.tyvek.com

2.2 MATERIALS

- A. Basis of Design: spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont[™] Tyvek[®] CommercialWrap[®] and related assembly components.
- B. Performance Characteristics:
 - 1. Air Penetration: 0.001 cfm/ft2 at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft2 at 75 Pa, when tested in accordance with ASTM E2357.
 - 2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
 - 3. Water Penetration Resistance: Minimum 280 cm when tested in accordance with AATCC Test Method 127.

- 4. Basis Weight: Minimum 2.7 oz/yd2, when tested in accordance with TAPPI Test Method T-410.
- 5. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.
- 6. Tensile Strength: Minimum 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
- 7. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
- 8. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 10, Smoke Developed: 10.

2.3 ACCESSORIES

- A. Seam Tape: As recommended by the weather barrier manufacturer.
- B. Fasteners:
 - 1. Nail Caps: #4 nails with large 1-inch plastic cap fasteners, or 1-inch plastic cap staples with leg length sufficient to achieve a minimum penetration of 5/8-inch into the wood stud.
- C. Sealants
 - 1. Refer to Section 07 92 00 Joint Sealants

OR

- 2. Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions.
- 3. Products: Sealants recommended by the weather barrier manufacturer.
- D. Adhesives:
 - 1. Provide adhesive recommended by weather barrier manufacturer.
 - 2. Products: Adhesives recommend by the weather barrier manufacturer.
- E. Primers:
 - 1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
 - 2. Products: Primers recommended by the flashing manufacturer.
- F. Flashing
 - 1. Flexible membrane flashing materials for window openings and penetrations recommended by manufacturer.

PART 3 - EXECUTION

- 3.1 EXAMINATION
 - A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.
- 3.2 INSTALLATION WEATHER BARRIER
 - A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.
 - B. Install weather barrier prior to installation of windows and doors.

- C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
- D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.
- E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
- F. Window and Door Openings: Extend weather barrier completely over openings.
- G. Overlap weather barrier
 - 1. Exterior corners: minimum 12 inches.
 - 2. Seams: minimum 6 inches.
- H. Weather Barrier Attachment:
 - 1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 12-18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
- I. Apply flashing to weather barrier membrane prior to installing cladding anchors.
- 3.3 SEAMING
 - A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
 - B. Seal any tears or cuts as recommended by weather barrier manufacturer.
- 3.4 OPENING PREPARATION (for use with non-flanged windows all cladding types)
 - A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.
 - B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.
- 3.5 FLASHING (for use with non-flanged windows all cladding types)
 - A. Cut flexible flashing a minimum of 12 inches longer than width of sill rough opening.
 - B. Cover horizontal sill by aligning flexible flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
 - C. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
 - D. Apply 9-inch wide strips of flashing at jambs. Align flashing with interior edge of jamb framing. Start flashing at head of opening and lap sill flashing down to the sill.
 - E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.
 - F. Install flexible flashing at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.
 - G. Coordinate flashing with window installation.
 - H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C1193.
 - I. Position weather barrier head flap across head flashing. Adhere using flashing over the 45degree seams.

- J. Tape top of window in accordance with manufacturer recommendations.
- K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C1193.
- 3.6 OPENING PREPARATION (for use with flanged windows
 - A. Cut weather barrier in an "I-cut" pattern. A modified I-cut is also acceptable.
 - 1. Cut weather barrier horizontally along the bottom and top of the window opening.
 - 2. From the top center of the window opening, cut weather barrier vertically down to the sill.
 - 3. Fold side and bottom weather barrier flaps into window opening and fasten.
 - B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.
- 3.7 FLASHING (for use with flanged windows)
 - A. Cut flexible flashing a minimum of 12 inches longer than width of sill rough opening.
 - B. Cover horizontal sill by aligning flexible flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
 - C. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges if necessary.
 - D. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.
 - E. Install window according to manufacturer's instructions.
 - F. Apply strips of flashing at jambs overlapping entire mounting flange. Extend jamb flashing 1inch above top of rough opening and below bottom edge of sill flashing.
 - G. Apply strip of flashing as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
 - H. Position weather barrier head flap across head flashing. Adhere flashing over the 45-degree seams.
 - I. Tape head flap in accordance with manufacturer recommendations.
 - J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.
- 3.8 THRU-WALL FLASHING INSTALLATION
 - A. Apply primer per manufacturer's written instructions.
 - B. Install preformed corners and end dams bedded in sealant in appropriate locations along wall.
 - C. Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.
 - D. Extend membrane through wall and leave ¹/₄ inch minimum exposed to form drip edge.
 - E. Roll flashing into place. Ensure continuous and direct contact with substrate.
 - F. Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant.
- 3.9 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT BASE OF WALL

C.

- A. Overlap thru-wall flashing with weather barrier by 6-inches.
- B. Mechanically fasten bottom of weather barrier through top of thru-wall flashing.
- C. Seal vertical and horizontal seams with tape or sealing membrane.
- 3.10 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT SHELF ANGLE
 - A. Seal weather barrier to bottom of shelf angle with sealing membrane.
 - B. Apply thru-wall flashing to top of shelf angle. Overlap thru-wall flashing with weather barrier by 6-inches.
 - Seal bottom of weather barrier to thru-wall flashing with tape or sealing membrane
- 3.11 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT WINDOW HEAD
 - A. Cut flap in weather barrier at window head.
 - B. Prime exposed sheathing.
 - C. Install lintel as required. Verify end dams extend 4 inches minimum beyond opening.
 - D. Install end dams bedded in sealant.
 - E. Adhere 2 inches minimum thru-wall flashing to wall sheathing. Overlap lintel with thru-wall flashing and extend ¹/₄ inch minimum beyond outside edge of lintel to form drip edge.
 - F. Apply sealant along thru-wall flashing edges.
 - G. Fold weather barrier flap back into place and tape bottom edge to thru-wall flashing.
 - H. Tape diagonal cuts of weather barrier.
 - I. Secure weather barrier flap with fasteners.
- 3.12 FIELD QUALITY CONTROL
 - A. Notify manufacturer's designated representative to obtain [required] periodic observations of weather barrier assembly installation.
- 3.13 PROTECTION
 - A. Protect installed weather barrier from damage.

END OF SECTION

PAGE 1 OF 4

VAPOR RETARDER

PART 1 GENERAL

SECTION 07 26 00

1.01 DESCRIPTION

- Α. Work Included:
 - 1. Sheet materials required to continue vapor retarder from wall to roof, fascia, soffit, and floor construction
 - 2. Sheet materials, required to continue vapor retarder from wall to window, door and louver frames.
- Β. Products Furnished but Not Installed Under This Section:
 - 1. Furnish Vapor Retarder Type 2 to Section 033000 for installation under slabs on grade.
- C. Related Work Described Elsewhere:

1.	Board Insulation	Section 072120
2.	Batt and Blown-In Insulation	Section 072130
3.	Joint Sealers	Section 079000
4.	Hollow Metal Doors and Frames	Section 081110

D. **Reference Standards:**

- 1. Federal Specifications (FS):
 - a. TT-S-230 Sealing Compound, Synthetic Rubber Base, Single Component, Chemically Cured for Caulking, Sealing and Glazing.
 - b. FF-N-105 Nail, Brads, Staples, and Spikes: Wire, Cut and Wrought.

1.02 SYSTEM DESCRIPTION

- Materials of this Section shall provide continuity of building enclosure vapor and are barrier in Α. conjunction with materials in Sections 072120, 072130, and 072140.
- Β. Sheet and sealing materials to seal gaps between building enclosure components.

1.03 SUBMITTALS

- Α. Submit manufacturer's product data and installation instructions under provisions of Section 013400.
- Β. Submit complete description information and a certificate of compliance with requirements of these specifications.

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PART 2 PRODUCTS

2.01 SHEET MATERIALS

Vapor Retarder: (Limited Locations) Minimum 6 mil thick clear polyethylene film conforming to physical property requirements of ASTM C171; 0.08 perm rating or lower vapor transmission.

1. Vapor retarder material is limited to locations where the sheet material is in substantial contact with the unexposed surface of the wall or ceiling finish, per UBC 1713 (c), exception 2.

2.02 SEALANTS

- A. Sealant: Specified under Section 079000.
- B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

2.03 ADHESIVES

- A. Adhesive for Bonding Field Applied Laps and Joints: Conform to recommendations of manufacturer of the vapor retarder material for its intended use; non-flammable when dry, non-corrosive to metals, and non-leaching; suitable for permanent joints in the vapor retarder.
 - Joints bonded with the adhesive material shall remain flexible at temperatures between 0 degrees F and 120 degrees F and withstand alternate freezing and thawing without detrimental effects.
- B. Mastic for applying on vapor retarder where penetrations are anticipated shall conform to recommendations of manufacturer of the vapor retarder material for its intended use.
 - 1. Adhesives and mastic shall be compatible with the materials to which applied, and shall not corrode, soften or otherwise attack the vapor retarder materials in either the wet or dry state.
- C. Adhesive for Vapor Retarder: Gun grade mastic type compatible with sheet barrier and substrate, permanently noncuring.

2.04 ACCESSORIES

- A. Tape: Oriented polypropylene with acrylic adhesive, providing the following minimum characteristics:
 - 1. 100 percent elongation, 20 lb/in. tensile strength.
 - 2. 16 oz./in. 180 degree peel adhesion.
 - 3. Working temperature range: -30 degrees F to 200 degrees F.
 - 4. Moisture vapor transmission: 0.4 gm/100 sq in. in 24 hours at 100 degrees F and 90 percent R.H.
- B. Fasteners: Galvanized, large headed roofing nails or staples; FS FF-N-105.

PART 3 EXECUTION

3.01 PREPARATION

- A. Review and coordinate sequencing of work to ensure that everything to be covered by vapor retarder has been accomplished, and that openings, chases, supplementary framing, and blocking and similar provisions have been completed. Verify that insulation has been properly installed voids, gaps or sags.
- B. Verify substrate materials are clean and dry, ready to receive work of this Section. Remove loose or foreign matter which impairs adhesion.
- C. Coordinate work with other affected Sections. Protect insulation at all times against migration of moisture vapor.
- D. Clean and prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions. Comply with manufacturer's instructions regarding application temperature limitations.

3.02 INSTALLATION

- A. Secure vapor retarder with compression-type automatic staplers or large headed nails. Adjust pressure of staplers to avoid rupturing or tearing vapor retarder material.
- B. Lap joints minimum 16 in. Provide vapor retarder over the top of interior partitions to provide 16" lap at ceiling vapor retarder. This minimum lapping shall apply to all areas where the vapor retarder material unites with itself or other materials or surfaces such as at corners and wall openings. Repair or replace vapor retarder material with tears, breaks or ruptures. Seal all laps with adhesive or tape, as appropriate to condition to achieve vapor tight construction. Laps to occur over framing or furring.
- C. Install vapor retarder with square internal corners to facilitate installation of finish materials.
- D. Tape termination of vapor retarder to substrate.
- E. Seal fastener and other penetrations (including electrical boxes and pipes) through vapor retarder with adhesive or tape, as appropriate to condition to achieve vapor tight construction.
 - 1. Where pipes, conduits, fixtures, wiring or outlets boxes, etc., penetrate the vapor retarder, the penetration and retarder shall be sealed vapor tight. Wall and fascia openings shall be completely sealed to the inside edges of the finished frames. Special care shall be exercised to ensure that the retarder is adequately sealed at all junctions, corners, edges and penetrations.
- F. Apply adhesive in strict accordance with the adhesive manufacturer's printed instructions.
- G. Install vapor retarder between door and window frames and adjacent wall and seal with adhesive. Equal to "Tremco" acoustic sealant. Caulk with sealant to ensure complete seal.
- H. After installation of vapor retarder, adhesive and tape, and minimum 24 hours prior to installing any wall finish, in each area, Contractor shall notify Owner's Representative. Vapor retarder installation will be thoroughly inspected prior to concealment. Any break, rupture, tear, or failure to provide a positive vapor retarder seal shall be sealed vapor tight in an approved manner.
- I. Do not allow finished to be applied over vapor retarder which has not been inspected.

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END OF SECTION

SECTION 07 31 13

DIVISION 07 SECTION 07 31 13 ASPHALT SHINGLES

ASPHALT SHINGLES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. High profile laminate asphalt shingles.
 - B. Underlayment and accessories.

1.2 RELATED SECTIONS

A. Section 061000 - Rough Carpentry.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C209 Standard Test Methods for Cellulosic Fiber Insulating Board.
 - 2. ASTM C1289 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - 3. ASTM D226 Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 - 4. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
 - 5. ASTM D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 6. ASTM D2126 Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
 - 7. ASTM D3018 Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.
 - 8. ASTM D3161 Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
 - 9. ASTM D3462 Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
 - 10. ASTM D4586 Standard Specification for Asphalt Roof Cement, Asbestos- Free.
 - 11. ASTM D4601 Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
 - 12. ASTM D4869 Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
 - 13. ASTM D6757 Standard Specification for Underlayment Felt Containing Inorganic Fibers Used in Steep-Slope Roofing.
 - 14. ASTM D7158 Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method).
 - 15. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 16. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
 - 17. ASTM E108 Standard Test Methods for Fire Tests of Roof Coverings.
- B. Underwriters Laboratory (UL):
 - 1. UL 790 Standard Test Methods for Fire Tests of Roof Coverings.
 - 2. UL 2218 Impact Resistance of Prepared Roof Covering Materials.

1.4 SUBMITTALS

A. Submit under provisions of Section 013400 – Shop drawings, Product data and samples.

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- 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. Samples for Selection: For the following products, of sizes indicated: For each product specified, two complete sets of color samples representing manufacturer's full range of available colors and patterns.
 - 1. Asphalt Shingles: Full size.
 - 2. Asphalt Starter Shingles: Full size.
 - 3. Flexor Polymer Modified Fiberglass Hip and Ridge Shingles: Full size.
 - 4. Synthetic Underlayment: 12 inches (305 mm) square.
 - 5. Flexor Polymer Modified Self-Adhering Fiberglass Reinforced Underlayment: 12 inches (305 mm) square.
 - 6. Flexor Polymer Modified Fiberglass Reinforced Underlayment: 12 inches (305 mm) square.
 - 7. Nails Used for Fastening Shingles: 5 of each nail type and size.
 - 8. Vented Nail Base: 12 inches (305 mm) square.
- D. Samples for Verification: For the following products, of sizes indicated: For each product specified, two samples representing actual product, color, and patterns.
 - 1. Asphalt Shingles: Full size.
 - 2. Asphalt Starter Shingles: Full size.
 - 3. Flexor Polymer Modified Fiberglass Hip and Ridge Shingles: Full size.
 - 4. Synthetic Underlayment: 12 inches (305 mm) square.
 - 5. Flexor Polymer Modified Self-Adhering Fiberglass Reinforced Underlayment: 12 inches (305 mm) square.
 - 6. Flexor Polymer Modified Fiberglass Reinforced Underlayment: 12 inches (305 mm) square.
 - 7. Nail Used for Fastening Shingles: 5 of each nail type and size.
 - 8. Vented Nail Base: 12 inches (305 mm) square.

1.5 QUALITY ASSURANCE

- A. Primary Roofing Materials Manufacturer Requirements:
 - 1. Manufacturer specified asphalt shingles for a minimum of ten years.
 - Manufacturer shall be an associate member in good standing of either the National Roofing Contractors Association (NRCA), Western States Roofing Contractors Association (WSRCA), or the Midwest Roofing Contractors Association (MRCA).
- B. Installer Qualifications: Approved by the manufacturer to install the specified products and provide the specified warranties.
- C. Source Limitations: Obtain hip and ridge shingles, starter, all underlayment products, insulation, and vented nail base from single source, from single manufacturer.
- D. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
- E. Exterior Fire-Test Exposure: Class A; ASTM E108 or UL 790, for application and roof slopes indicated.
- F. 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

3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

Architect.

- 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.

1.7 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. Standard Warranty: Shingles subjected to terms and conditions of the standard Manufacturer's Limited Warranty. Wind warranty coverage is subject to the shingles being sealed.
 - 1. Warranty Length: 50 years.
 - 2. Limited Term Resistance to Wind: 130 mph (209 kph).
 - 3. Scotchgard Protector warranty shall include 3M Scotchgard algae resistance to discoloration from algae growth for a period of 20 years from the date of substantial completion.
- B. Upon project completion and acceptance by Owner, the Roofing Contractor shall promptly provide executed copies of the specified warranties.
- C. Furnish a list containing the names and contact telephone numbers of the Roofing Contractor's Service Manager, Superintendent, and Project Manager and the Roofing Contractor's current mailing address.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Malarkey Roofing Products, which is located at: 3131 N. Columbia Blvd.
 P. O. Box 17217; Portland, OR 97217; Toll Free Tel: 800-545-1191; Tel: 503-283-1191; Fax: 503-289-7644; Email:request info (bmichiels@malarkeyroofing.com); Web:www.malarkeyroofing.com
- B. Substitutions: All other manufacturers: Submit substitution request in accordance with Section 01 63 00 "Product Options and Substitutions"

2.2 SHINGLES

- A. High Profile Laminate Shingles:
 - 1. Legacy XL Scotchgard (265) as manufactured by Malarkey Roofing Products.
 - a. Malarkey Legacy XL Scotchgard shingles hold a Class A Fire Rating.
 - b. As manufactured, Legacy XL Scotchgard meets the requirements of:
 - ASTM D7158 Class H, ASTM D3462, ASTM D3161 Class F, ASTM D3018 Type I, ASTM E108 Class A, UL 2218 Class 4 Impact Resistance, and CSA A123.5.
 - 2) Listed with Intertek/WHI.
 - c. Performance:
 - 1) Limited Material Warranty: 50 years.
 - 2) Enhanced Wind Warranty: 130 mph (209 kph).
 - 3) Scotchgard Protector Warranty: 20 years.

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4) Right Start Period: 15 years.

d. Performance:

- 1) Limited Material Warranty: 35 years.
- 2) Limited Wind Warranty: 10 years. 110 mph (177 kph).
- 3) Enhanced Wind Warranty: 130 mph (209 kph).
- 4) 20 years Scotchgard Protector Warranty.
- 5) Right Start Period: 10 years.
- B. Color: Color shall be selected from the manufacturer's full line of colors.

2.3 UNDERLAYMENT

1. See Sheet Membrane Waterproofing Specification Section 071100.

2.4 RIDGE VENT

A. Provide continuous ridge vent manufactured for asphalt shingle installation. Basis of design: Endura Ridge Vents.

2.5 RELATED PRODUCTS

- A. Endura Ridge Vents ventilation system.
- B. Full-Width Perforated Starter Shingle: Malarkey Smart Start No. 210.
- C. Full-Width Perforated Starter Shingle: Malarkey Smart Start No. 220.
- D. Plastic Roof Cement conforming to ASTM D4586.
- E. Fasteners: Hot Dip Galvanized Ring shank nails with minimum 3/8 inch (9.5 mm) head.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING IMPORT

- A. New and dry roof materials delivered to the job site in containers unopened and undamaged. Manufacturer's products stamped with labels, names, and run codes of manufacture and testing laboratory.
- B. Store underlayment materials on ends only. Discard rolls which may have been flattened, creased, or otherwise damaged. Place materials on pallets or wood sleepers. Do not stack palletized materials.
- C. Cover underlayment rolls with weatherproof materials secured to prevent materials from becoming exposed to moisture. Use breathable tarps.
- D. Disperse materials stored on the roof surface to avoid concentrated loading. Set larger concentrations over structural members.

3.2 ENVIRONMENTAL REQUIREMENTS

A. Application of roofing materials shall not be performed when weather conditions interfere with good roofing practices.

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- 3.3 UNDERLAYMENT AND EDGING
 - A. Apply specified underlayment as follows:
 - Slopes of 4 units in 12 units or greater, apply single layer, polymer modified fiberglass or synthetic underlayment laid parallel to eaves, lapping to the 2 inches (51 mm) or 4 inches (102 mm) ply line, and 6 inches (152 mm) on ends, end laps staggered 6 feet (1829 mm) from course to course.
 - Slopes of 4 units in 12 units or greater in ice dam regions, apply self-adhering, polymer modified underlayment along eaves and rakes to a point 24 inches (610 mm) beyond the interior surface of exterior walls. From there, apply single layer polymer modified fiberglass or synthetic underlayment, lapping over self-adhering underlayment a minimum of 6 inches (152 mm).
 - 3. Slopes of less than 4 units in 12 units, apply double layer of specified underlayment laid parallel to eaves, installed shingle fashion with 50 percent side laps and 6 inches (152 mm) end laps.
 - 4. Slopes of less than 4 units in 12 units in ice dam regions, apply double layer of self-adhering underlayment along eaves and single layer on rakes to a point 24 inches (610 mm) beyond the interior surface of exterior walls. From there, apply double layer, polymer modified fiberglass or synthetic underlayment, installed shingle fashion with 50 percent side laps and 6 inches (152 mm) end laps.
 - 5. Optional installation for slopes of less than 4 units in 12 units in ice dam or coastal regions, areas of wind-driven rain, or homes with double-slope construction, apply double layer of self-adhering underlayment over entire roof. Ensure ventilation and moisture control issues are addressed.
 - B. Valleys: Only those valley installations listed in the manufacturer's installation instructions shall be permitted.
 - 1. Regardless of valley method used, begin application by centering a full-width valley liner of selfadhering underlayment to the roof deck in all valleys.
 - The field underlayment is then woven through the valley over the layer of self-adhering underlayment or lapped 6 inches (152 mm) on each side. If fastening the field underlayment, be aware no fasteners are allowed within 6 inches (152 mm) of the valley centerline.
 - C. Pipe Flashing: Apply a bead of roofing cement around the pipe, sealing it to the underlayment prior to installing the metal pipe flashing. Install and secure the metal jack so that the bottom flange laps over onto the shingles. Side and top flanges shall have shingles lapping onto the flange. Shingles that lap onto metal shall be laid into a bed of roof cement. A bead of urethane sealant shall be applied where the pipe penetrates the cone of the jack.
 - D. Perimeter Flashing: Use non-corrosive, 26 gauge (0.55 mm) sheet metal drip edge flashing. Install prior to underlayment on eave edges of roof and then along rake edges over the ends of installed underlayment. Install drip edge with flanges large enough (recommend 4 inch (102 mm) flanges) to completely cover roof edges. Secure with galvanized roofing nails, centered on the top flange at 8 to 10 inches (203 to 254 mm) O.C.

3.4 APPLICATION OF SHINGLES

- A. Laminate Shingle Application; 5-5/8 inches (143 mm) Offset Diagonal Pattern:
 - 1. Starter courses: Use Malarkey starter shingles or 3-tab shingles with the tabs cut off; apply to eave and rake edges of roof.
 - Cut 6 inches (152 mm) off the length of the starter strip and apply at the lower, left-hand corner of roof. The starter course shall overhang the edge metal 1/4 to 3/4 inch (6 mm to 19 mm). Fasten with four (4) nails, 1-1/2 to 3 inches (38 to 76 mm) up from the eave with one fastener 1 inch (25 mm) from each end and the remaining two evenly spaced on the same

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line as the end fasteners.

- 3. Continue starter course across the roof with a full-length shingles, butting them loosely together to avoid buckling.
- 4. First course: Start with a full shingle applied directly over the starter course at the lower lefthand corner of the roof, and secure with fasteners.
- 5. Second course: Cut 5-5/8 inches (143 mm) off the left end of a full shingle and apply the remaining 34-3/8 inch (873 mm) piece over the first course shingle. Align the bottom edge along a line level with the "sawtooth" overlay in the preceding course, exposing the first course 5-5/8 inches (143 mm). Secure with fasteners.
- 6. Succeeding Courses: Courses three through seven are begun with partial shingles, each progressively 5-5/8 inches (143 mm) shingle shorter, establishing the overall diagonal pattern or stair-step effect. (Pieces cut from shingles along one rake edge can be used to finish off courses on the opposite rake.)
- 7. Apply a full shingle adjacent to each of the first seven courses to extend the pattern.
- 8. Courses eight through fourteen repeat the process beginning with a full shingle and repeat the 1-to-7 course cycle on up the roof.
- 9. Strike a chalk line every six courses or so to ensure straight courses. Shingles may be laid from either the left- or right-hand side. Start at either rake edge and follow layout and cutting instructions as required for proper application. Fill-in pieces less than three inches (76 mm) in width are not acceptable at rake edges.
- B. Valley Installation:
 - 1. Closed-cut valleys: Start on the roof face that has less slope or height. Lay a first course of shingles along the eave, across the valley, and onto the adjoining roof a minimum 12 inches (305 mm). Press shingles well into the break of the valley and fasten no closer than 6 inches (152 mm) from the valley centerline. Add a fastener in the upper corner of the last shingle crossing the valley. Repeat this process with the first course of shingles on the intersecting roof. Note: The first course of shingles is the only one woven in this fashion. Return to the side of the roof you began with, and resume laying shingle courses across the valley and onto the adjoining roof. Complete installation of shingles on that roof face. Snap a chalk line 2 inches (51 mm) from the centerline of the valley on the unshingled side, and begin applying shingle courses there, trimming the ends diagonally to match the centerline angle. Crop the tops of each valley shingle at a 1 inch (25 mm), 45 degree cut. Embed the ends of the cut valley shingles in a continuous 3 inches (76 mm) wide bead of mastic.
 - 2. Open metal valleys: Install minimum 24 inches (610 mm) wide, 26 gauge, metal valley flashing over the valley liner, and secure with fasteners no more than 1 inch (25 mm) from the outside edges at a spacing of 10 inches (254 mm) to 12 inches (305 mm) on center. Overlaps in the metal should be a minimum of 4 inches (102 mm) and embedded in a continuous bead of sealant. Do not fasten the metal laps. Lay a first course of shingles along the eave of one roof area and over the valley, making sure the end of the last shingle meets or goes beyond the centerline of the metal valley. Complete the installation of shingles on that roof section. After all shingles have been installed in the valley, snap a chalk line 2 inches (51 mm) from the center of the metal valley, and trim shingles to the chalk line, matching the centerline angle. Crop the tops of each shingle course at a 1 inch (25 mm), 45 degree cut. Embed the ends of the cut valley shingles in a continuous 3 inches (76 mm) wide bead of mastic. Install shingles on the adjoining roof as described above.
 - 3. "Bleeder, Point," or "California" valleys are not acceptable.

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- 3.5 FASTENERS
 - A. Laminate Nailing Pattern: Nails must be placed within the nailing zone, 1 inch (25 mm) in from each end of the shingle and the remaining nails evenly spaced on the same line as the end nails. Fasteners shall not be overdriven to cut into shingles or underdriven. Fasteners shall be seated flush to the shingle surface as illustrated on the shingle wrapper. When fastening, butt shingles loosely together to prevent buckling.
 - 1. Fasteners per shingle: Four.
 - 2. Fasteners per shingle/high wind areas: Six, including starter shingles.
 - 3. Steep Slope Fastening for Roof Decks Greater Than 21:12: Six, including starter shingles, and hand-sealing underneath.

END OF SECTION

SECTION 07 42 13

METAL WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Metal lap-seam wall panels with exposed fasteners including trim and accessories.

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 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

2. ASTM A 792 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

3. ASTM A 1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

4. ASTM D 2244 – Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.

5. ASTM D 4214 – Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

6. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

7. ASTM E 283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

8. ASTM E 330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

9. ASTM E 331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

10. ASTM E 1592 – Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

C. Underwriters Laboratories (UL):

1. UL 263 - Fire Tests of Building Construction and Materials.

D. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "Architectural Sheet Metal Manual."

E. 2010 State of Florida Building Code:

1. Approval 9482.1.

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, 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. Deliver with Product Technical Data.

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.

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 QUALITY ASSURANCE

A. Manufacturer Qualifications:

- 1. Provider of advanced installer training.
- 2. Minimum of ten years of experience in manufacturing metal wall panel systems.

3. Provider of products produced in a permanent factory environment with fixed roll-forming equipment.

B. Installer Qualifications:

1. At least five years of experience in the installation of metal wall panels.

2. 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 wall panel system.

3. 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.

1.7 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.

1.8 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, 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.

PART 2 PRODUCTS

2.1 METAL WALL PANELS

A. Basis of Design Product: Subject to compliance with requirements provide Metal Sales Manufacturing Corporation; 7/8" Corrugated.
B. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 01 63 00 - "Product Options and Substitutions "

C. Product Options:

- 1. Panel coverage: 34-2/3 inches (880.5 mm).
- 2. Rib Height: 7/8 inch (22.2 mm).

3. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, AZ50 structural quality, Grade 50, 0.0236-inch (0.60-mm) minimum thickness.

- 4. Attachment: Exposed direct fastened panel.
- 5. Application: Designed for application over open framing or solid substrate.
- 6. Rib Configuration: Sinusoidal.
- 7. Surface Finish: PVDF (Kynar 500)
- 8. Color: As selected by Architect from manufacturer's full range of colors
- 9. Fire Resistance Rating: Comply with UL 263.
- 10. Air Leakage: 0.004 cfm/sq. ft. when tested according to ASTM E 283.
- 11. Water Penetration: None at 12 psf when tested according to ASTM E 331.

12. Structural Performance: Tested according to requirements of ASTM E 330 and ASTM E 1592.

13. Code and Testing Agency Approvals: Comply with 2010 State of Florida Building Code Approval 9482.1.

2.5 ACCESSORIES

A. Products: Provide all trim, flashings and accessories as required per manufacturers recommendations.

1. Basis of Design Product: Subject to compliance with requirements provide Metal Sales Manufacturing Corporation.

2. Color: As selected by Architect from manufacturer's full product range.

2.6 SOURCE QUALITY CONTROL

A. Source: Obtain metal wall panels, trim and other accessories from a single manufacturer.

B. Quality Control: Obtain metal wall panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 EXECUTION

3.2 PREPARATION

A. Miscellaneous Framing: Install furring, angles, subpurlins, and other miscellaneous wall panel support members and anchorage according to metal wall panel manufacturer's recommendations.

3.4 METAL WALL 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 wall panels to supports with concealed clips at each standing-seam joint at location, spacing, and using proper fasteners as recommended by panel manufacturer.

3.5 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 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.

3.8 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

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SECTION 07 42 65

METAL COMPOSITE PANEL SYSTEM

- PART 1 GENERAL
- 1.01 SCOPE
 - A. SECTION INCLUDES
 - 1. The extent of panel system work is indicated on the drawings and in these specifications.
 - 2. Panel system requirements include the following components:
 - a. Aluminum faced composite panels with mounting system. Panel mounting system including anchorages, shims, furring, fasteners, gaskets and sealants, related flashing adapters, and masking (as required) for a complete installation.
 - b. Parapet coping, column covers, soffits, sills, border, and filler items indicated as integral components of the panel system or as designed.
 - B. RELATED DOCUMENTS
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, and Technical Specification Divisions 2 through 16 apply to this Section.
 - C. RELATED WORK SPECIFIED ELSEWHERE
 - 1. Section 076200: Flashing and Trim
 - 2. Section 079000: Joint Sealants
- 1.02 QUALITY ASSURANCE
 - A. Composite Panel Manufacturer shall have a minimum of 20 years' experience in the manufacturing of this product.
 - B. Composite Panel Manufacturer shall be solely responsible for panel manufacture and application of the finish.
 - C. Fabricator/installer shall be acceptable to the composite panel manufacturer.

Contact the Customer Relations Department at 3A Composites USA, Inc. (800-626-3365 or 270-527-4200) or www.alucobondusa.com, for information on the Distributor Network in a specific geographic region.

- D. Fabricator/Installer shall have a minimum 5 years' experience of metal panel work similar in scope and size to this project.
- E. Field measurements should be taken prior to the completion of shop fabrication whenever possible. However, coordinate fabrication schedule with construction progress as directed by the Contractor to avoid delay of work. Field fabrication may be allowed to ensure proper fit. However, field fabrication shall be kept to an absolute minimum with the majority of the fabrication being done under controlled shop conditions.
- F. Shop drawings shall show the preferred joint details providing a structurally sound wall panel system that allows no uncontrolled water penetration on the inside face of the panel system as determined by ASTM E 331. Systems not utilizing a construction sealant at the panel joints (i.e. Rout and Return Dry and Rear Ventilated System) shall provide a means of concealed drainage with baffles and weeps for water which may accumulate in members of the system.

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- G. Maximum deviation from vertical and horizontal alignment of erected panels: 6mm (1/4") in 6m (20') non-accumulative.
- H. Panel fabricator/installer shall assume undivided responsibility for all components of the exterior panel system including, but not limited to attachment to sub-construction, panel to panel joinery, panel to dissimilar material joinery, and joint seal associated with the panel system.
- I. Composite panel manufacturer shall have established a Certification Program acceptable to the local Code Authorities.

1.03 REFERENCES

- A. Aluminum Association
 - 1. AA-M12C22A41: Anodized Clear Coating
 - 2. AA-M12C22A44: Anodized Color Coating
- B. American Architectural Manufacturers Association
 - 1. AAMA 508-05: Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems
- C. American Society for Testing and Materials
 - 1. E 330 Structural Performance of Exterior Windows, Curtain Walls, and Doors Under the Influence of Wind Loads
 - 2. E 283 Rate of Leakage through Exterior Windows, Curtain Walls, and Doors
 - 3. D 1781 Climbing Drum Peel Test for Adhesives
 - 4. E 84 Surface Burning Characteristics of Building Materials
 - 5. D 1929 Standard Test for Ignition Properties of Plastics
 - 6. D 3363 Method for Film Hardness by Pencil Test
 - 7. D 2794 Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
 - 8. D 3359 Methods for Measuring Adhesion by Tape Test
 - 9. D 2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
 - 10. B 117 Method of Salt Spray (Fog) Testing
 - 11. D 2244 Calculation of Color Differences from Instrumentally Measured Color Coordinates
 - 12. D 4214 Evaluating the Degree of Chalking of Exterior Paint Films
 - 13. D 822 Practice for Operating Light and Water Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products
 - 14. D 1308 Effect of Household Chemicals on Clear and Pigmented Organic Finishes

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- D. International Conference of Building Officials
 - 1. NFPA 285 Intermediate Scale Multi Story Test

1.04 SUBMITTALS

- A. Submittals shall be in conformance with Section 013400.
- B. Samples
 - 1. Panel System Assembly: Two samples of each type of assembly. 304mm (12") x 304mm (12") minimum.
 - 2. Provide Two samples of each color and finish for selection, 76mm (3") x 102mm (4") minimum.
- C. Shop Drawings
 - 1. Submit shop drawings showing project layout and elevations; fastening and anchoring methods; detail and location of joints, sealants, and gaskets, including joints necessary to accommodate thermal movement; trim; flashing; and accessories.
- D. Affidavit certifying material meets requirements specified.
- E. Two copies of manufacturer's literature for panel material.
- F. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 01 63 00 "Product Options and Substitutions "

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect finish and edges in accordance with panel manufacturer's recommendations.
- B. Store material in accordance with panel manufacturer's recommendations.

PART 2 PRODUCTS

2.01 PANELS

- A. COMPOSITE PANELS
 - ALUCOBOND Plus material manufactured by 3A Composites USA, Inc. 208 West 5th Street Benton, KY 42025 (800-626-3365 or 270-527-4200)
 - 2. Items of the same function and performance, which have received prior approval from the architect, shall be allowed for this project. Approval shall be based on documentation submitted showing the adequacy of the material. Substitutions: Under provisions of Section 016300.

- B. THICKNESS: 4MM (0.157")
- PAGE 4 OF 9

C. PRODUCT PERFORMANCE

- 1. Bond Integrity
 - a. When tested for bond integrity, in accordance with ASTM D 1781 (simulating resistance to panel delamination), there shall be no adhesive failure of the bond a) between the core and the skin nor b) cohesive failure of the core itself below the following values:

Peel Strength: 100 N·mm/mm (22.5 in lb/in) as manufactured 100 N·mm/mm (22.5 in lb/in) after 21 days soaking in water at 70°F (21°C)

- 2. Fire Performance
 - a. ASTM E 84 Max. Flame Spread 25, Max. Smoke Developed 450
 - b. NFPA 285 Panels shall meet requirements of the Intermediate Scale Multi Story Test

D. FINISHES

- 1. Coil coated KYNAR[®] 500 in conformance with the following general requirements of AAMA 2605.
 - a. Color:
 - 1) Standard color as selected by the owner / architect / owner from manufacturer's standard colors.
 - b. Coating Thickness:
 - 1) Colors: 1.0 mil (±0.2 mil)
 - 2) Clear: 0.50 mil (±0.05 mil)
 - c. Hardness: ASTM D 3363; HB minimum using Eagle Turquoise Pencil.
 - d. Impact:
 - 1) Test method: ASTM D 2794; Gardner Variable Impact Tester with 5/8" (15.9mm) mandrel.
 - 2) Coating shall withstand reverse impact of 1.5 in lb per mil substrate thickness (0.681 m·kg per mm substrate).
 - Coating shall adhere tightly to metal when subjected to #600 Scotch Tape pick-off test. Slight minute cracking permissible. No removal of film to substrate.
 - e. Adhesion:
 - 1) Test Method: ASTM D 3359.
 - Coating shall not pick off when subjected to a grid of 11 cuts x 11 cuts, 1/16" apart, and taped with #600 Scotch Tape.
 - f. Humidity Resistance
 - 1) Test Method: ASTM D 2247.
 - 2) No formation of blisters when subjected to condensing water fog at 100% relative humidity and 100°F (37.8°C) for 4000 hours.

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			g.	Salt S	pray Resistance:	
			 g. Salt Spray Resistance: Test Method: ASTM B 117; Expose coating system to 4000 hours using 5% NaCl solution. Corrosion creepage from scribe line: 1/16" max. (1.6mm). Minimum blister rating of 8 within the test specimen field. h. Weather Exposure Outdoor: Ten-year exposure at 45" angle facing south Florida exposure. Maximum color change of 5 Delta E units as calculated in accorda with ASTM D 2244. Maximum chalk rating of 8 in accordance with ASTM D 4214. No checking, crazing, adhesion loss. i. Chemical Resistance: ASTM D 1308 utilizing 10% Muriatic Acid for an exposure time of minutes. No loss of film adhesion or visual change when viewed by unaided eye. ASTM D 1308 utilizing 20% Sulfuric Acid for an exposure time of hours. No loss of film adhesion or visual change when viewed by unaided eye. AAMA 2605 utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes. Maximum color change of 5 Delta E as calculated in accordance with ASTM D 2244. Achda 2605 utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes. Maximum color change of 5 Delta E as calculated in accordance with ASTM D 2244. 			
				Corrosion creepage from scribe line: 1/16" max. (1.6mm).		
				3)	Minimum blister rating of 8 within the test specimen field.	
			h.	Weath	ier Exposure	
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				2)	Ten-year exposure at 45° angle facing south Florida exposure.	
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				2)	ASTM D 1308 utilizing 20% Sulfuric Acid for an exposure time of 18 hours. No loss of film adhesion or visual change when viewed by the unaided eye.	
				3)	AAMA 2605 utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes. Maximum color change of 5 Delta E units as calculated in accordance with ASTM D 2244.	
	:	2.	Anodiz	ed:		
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			b.	 PAGE 5 OF Salt Spray Resistance: Test Method: ASTM B 117; Expose coating system to 4000 hours, using 5% NaCl solution. Corrosion creepage from scribe line: 1/16" max. (1.6mm). Minimum blister rating of 8 within the test specimen field. Weather Exposure Outdoor: Ten-year exposure at 45" angle facing south Florida exposure. Maximum color change of 5 Delta E units as calculated in accordance with ASTM D 2244. Maximum chalk rating of 8 in accordance with ASTM D 4214. No checking, crazing, adhesion loss. Chemical Resistance: ASTM D 1308 utilizing 10% Muriatic Acid for an exposure time of 15 minutes. No loss of film adhesion or visual change when viewed by the unaided eye. ASTM D 1308 utilizing 20% Sulfuric Acid for an exposure time of 18 hours. No loss of film adhesion or visual change when viewed by the unaided eye. AAMA 2605 utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes. Maximum color change of 5 Delta E unit as calculated in accordance with ASTM D 2244. nodized: Clear Coating: AA-M12C22A41 Architectural Class 1 Color Coating: AA-M12C22A44, light bronze, medium bronze, dark bronze an black, Architectural Class 1 For small quantity aluminum accent panels or custom color applications, provide a multi coat urethane finish in accordance with the paint manufacturer requirements. Igh Performance Clear: For application over pretreated natural and brushed aluminum substrates, provide a high-performance single coat clear finish.		
	;	3.	Uretha			
			a.			
		4.	High P			
			a.	For ap provid	plication over pretreated natural and brushed aluminum substrates, e a high-performance single coat clear finish.	
2.02	PANEL	FABRI	CATION			

- A. Composition:
 - 1. Two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process with no glues or adhesives between dissimilar materials. The core material shall be free of voids and/or air spaces and not contain foamed insulation material. Products laminated sheet by sheet in a batch process using glues or adhesives between materials shall not be acceptable.

- 1. Thickness: 0.5mm (0.0197") (nominal)
- 2. Panel Weight: 4mm (0.157"): 7.57 kg/m² (1.55 lb/ft²)

C. Tolerances

- 1. Panel Bow: Maximum 0.8% of any 1828mm (72") panel dimension.
- 2. Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.
- 3. Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle.
- 4. Maximum deviation from panel flatness shall be 1/8" (3.2mm) in 5'0" (1.52m) on panel in any direction for assembled units. (Non-accumulative No Oil Canning)
- D. System Characteristics
 - 1. Plans, elevations, details, characteristics, and other requirements indicated are based upon standards by one manufacturer. It is intended that other manufacturers, receiving prior approval, may be acceptable, provided their details and characteristics comply with size and profile requirements, and material/performance standards.
 - 2. System must not generally have any visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.
 - 3. System shall comply with the applicable provisions of the "Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual" by AAMA and ANSI/AAMA 302.9 requirements for aluminum windows.
 - 4. Fabricate panel system to dimension, size, and profile indicated on the drawings based on a design temperature of 70°F (21°C).
 - 5. Fabricate panel system so that no restraints can be placed on the panel, which might result in compressive skin stresses. The installation detailing shall be such that the panels remain flat regardless of temperature change and at all times remain air and water tight.
 - 6. The finish side of the panel shall have a removable plastic masking applied prior to fabrication, which shall remain on the panel during fabrication, shipping, and erection to protect the surface from damage.
- E. System Type 1. Rout
 - Rout and Return Dry:

System must provide a perimeter aluminum extrusion with integral weather-stripping as detailed on drawings.

- F. System Performance
 - 1. Composite panels shall be capable of withstanding building movements and weather exposures based on the following test standards required by the Architect and/or the local building code.
 - a. Wind Load Loads: As indicated on Drawings.

- Normal to the plane of the wall between supports, deflection of the secured perimeter-framing members shall not exceed L/175 or 3/4" (19mm), whichever is less.
- b. Air/Water System Test
 - Air Infiltration When tested in accordance with ASTM E 283, air infiltration at 1.57 lb/ft² (75 Pa) must not exceed 0.06 ft³/min. per ft² of wall area (305 cm³/s per m² of wall area).

Water Infiltration - Water infiltration is defined as uncontrolled water leakage through the exterior face of the assembly. Systems not using a construction sealant at the panel joints (i.e. Rout and Return Dry and Rear Ventilated Systems) shall be designed to drain any water leakage occurring at the joints. No water infiltration shall occur in any system under a differential static pressure of 6.24 lb/ft² (300 Pa) after 15 minutes of exposure in accordance with ASTM E 331.

2.03 ACCESSORIES

- A. Extrusions, formed members, sheet, and plate shall conform with ASTM B 209 and the recommendations of the manufacturer.
- B. Panel stiffeners, shall be structurally fastened or restrained at the ends and shall be secured to the rear face of the composite panel with silicone of sufficient size and strength to maintain panel flatness. Stiffener material and/or finish shall be compatible with the silicone.
- C. Sealants and gaskets within the panel system shall be as per manufacturer's standards to meet performance requirements.
- D. Fabricate flashing materials from 0.030" (0.76mm) minimum thickness aluminum sheet painted to match the adjacent curtain wall / panel system where exposed. Provide a lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bed of non-hardening sealant.
- E. Fasteners (concealed): Fasteners as recommended by panel manufacturer. Do not expose fasteners except where unavoidable and then match finish of adjoining metal.

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PART 3 EXECUTION

- 3.01 INSPECTION
 - A. Surfaces to receive panels shall be even, smooth, sound, clean, dry and free from defects detrimental to work. Notify contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with erection until unsatisfactory conditions have been corrected.
 - B. Surfaces to receive panels shall be structurally sound and secure.

3.02 INSTALLATION

- A. Erect panels plumb, level, and true.
- B. Attachment system shall allow for the free and noiseless vertical and horizontal thermal movement due to expansion and contraction for a material temperature range of -20°F to +180°F (-29°C to +82°C). Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement will not be permitted.
- C. Fabrication, assembly, and erection procedure shall account for the ambient temperature at the time of the respective operation.
- D. Panels shall be erected in accordance with an approved set of shop drawings.
- E. Anchor panels securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary thermal movement and structural support.
- F. Conform to panel fabricator's instructions for installation of concealed fasteners.
- G. Do not install component parts that are observed to be defective, including warped, bowed, dented, abraised, and broken members.
- H. Do not cut, trim, weld, or braze component parts during erection in a manner which would damage the finish, decrease strength, or result in visual imperfection or a failure in performance. Return component parts which require alteration to shop for refabrication, if possible, or for replacement with new parts.
- I. Separate dissimilar metals and use gasketed fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.

Α.

3.03 ADJUSTING AND CLEANING

- Remove and replace panels damaged beyond repair as a direct result of the panel installation. After installation, panel repair and replacement shall become the responsibility of the General Contractor.
- B. Repair panels with minor damage.
- C. Remove masking (if used) as soon as possible after installation. Masking intentionally left in place after panel installation on an elevation, shall become the responsibility of the General Contractor.
- D. Any additional protection, after installation, shall be the responsibility of the General Contractor.
- E. Make sure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- F. Final cleaning shall not be part of the work of this section.

END OF SECTION

SECTION 07 46 40

COMPOSITE TRIM

1.1 SUMMARY

- A. Section Includes:
 - 1. Trim and fascia.

1.2 COORDINATION

A. Coordinate installation with flashings, weather barriers, and other adjoining construction to ensure proper sequencing for weathertight performance.

B. Coordinate with finish coat to be applied over primed cladding and trim. Comply with coating manufacturer's written requirements for substrate primer.

1.3 ACTION SUBMITTALS

- A. Product Data: Trim and fascia.
- B. Shop Drawings: Included details of construction and installation.
- C. Samples: For each exposed product and texture specified, 12 inches long.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Signed by manufacturer certifying that engineered wood cladding complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for engineered wood cladding.

C. Research/Evaluation Reports: For each type of engineered wood cladding required, from ICC- ES.

D. Sample Warranty

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of product.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed in packaging acceptable to cladding manufacturer for storage with labels clearly describing contents.

1. Furnish full lengths of engineered wood trim and fascia including related

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accessories, in a quantity equal to 2 percent of amount installed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.

B. Store products in manufacturer's labeled packaging until ready for installation. Protect from damage.

C. Store products off the ground, on a flat surface, and under a roof or separate waterproof covering.

1.10 FIELD 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 limits.

1.11 WARRANTY

- A. Manufacturer's Standard Warranty:
 - 1. Warranty Period: Fifty years prorated from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide LP Building Products; LP SmartSide.

B. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

C. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 01 63 00 - "Product Options and Substitutions "

2.2 TRIM AND FASCIA

A. Fiber Substrate Trim and Fascia: 540 Series

- 1. Style: Smooth finish
- 2. Thickness: 0.910 inch (23 mm)
- 3. Width: As shown in drawings
- 4. Length: As shown in drawings.
- 5. Color: Factory primed and painted per Painting Section 099000.

2.5 ACCESSORIES

A. Fasteners: ASTM A153, hot-dip galvanized or stainless steel nails with 0.113 inch

diameter shank and 0.27 inch diameter head, long enough to achieve 1 1-1/2 inch penetration into structural sheathing and framing

B. Sealant: ASTM C920, minimum Class 25 sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify location of concealed framing for support and anchorage of composite wood trim and fascia.

B. Verify that substrate has been installed to permit proper installation of composite trim and fascia.

3.2 PREPARATION

A. Prepare substrates using methods recommended in writing by the cladding manufacturer.

B. Do not proceed with installation until substrates have been properly prepared and deviations from manufacturer's recommended tolerances are corrected.

C. Commencement of installation constitutes acceptance of conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

- 1. Install in accordance with conditions stated in ICC-ES ESR-1301.
- 2. Properly space joints to allow for equilibration.

B. Do not install to green wood or crooked structural framing. Do not install over rain soaked or buckled materials. Do not install if excessive moisture is present in the interior, including that from curing concrete and plaster.

C. Do not cut cladding to fabricate trim; use trim components.

D. After installation, seal and flash joints except the overlapping horizontal lap joints. Seal around penetrations. Paint exposed cut edges.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products.

END OF SECTION

07 46 40 - 3

EPDM ROOFING

PART 1 GENERAL

1.01 DESCRIPTION

A. The project consists of installing Fully Adhered Roofing System as outlined below:

Apply the Fully Adhered EPDM Roofing System in conjunction with 6" Polyisocyanurate Board Insulation over the new metal roof deck.

1.02 EXTENT OF WORK

- A. Provide all labor, material, tools, equipment, and supervision necessary to complete the installation of a Sure-Tough .060 inch thick reinforced EPDM membrane Mechanically-Fastened Roofing System including flashings and insulation as specified herein and as indicated on the drawings in accordance with the manufacturer's most current specifications and details.
- B. The roofing contractor shall be fully knowledgeable of all requirements of the contract documents and shall make themselves aware of all job site conditions that will affect their work.
- C. The roofing contractor shall confirm all given information and advise the building owner, prior to bid, of any conflicts that will affect their cost proposal.
- D. Any contractor who intends to submit a bid using a roofing system other than the approved manufacturer must submit for pre-qualification in writing fourteen (14) days prior to the bid date. Any contractor who fails to submit all information as requested will be subject to rejection. Bids stating "as per plans and specs" will be unacceptable.

1.03 SUBMITTALS

- A. Prior to starting work, the roofing contractor must submit the following:
 - 1. Shop drawings showing layout, details of construction and identification of materials.
 - 2. Sample of the manufacturer's Membrane System Warranty.
 - 3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
 - 4. Certification from the membrane manufacturer indicating the fasteners are capable of providing a static backout resistance of 10 inch pounds minimum is required.
 - 5. Certification of the manufacturer's warranty reserve.
- B. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the specifier prior to the issuance of the manufacturer's warranty.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in

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sufficient quantity to permit work to continue without interruption.

- B. Comply with the manufacturer's written instructions for proper material storage.
 - 1. Store materials, except membrane, between 60F and 80F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60F minimum temperature before using.
 - 2. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.
- C. Insulation must be on pallets, off the ground and tightly covered with waterproof materials.
- D. Any materials which are found to be damaged shall be removed and replaced at the applicator's expense.

1.05 WORK SEQUENCE

- A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections of the membrane system.
- B. Do not disrupt activities in occupied spaces.

1.06 USE OF THE PREMISES

- A. Before beginning work, the roofing contractor must secure approval from the building owner's representative for the following:
 - 1. Areas permitted for personnel parking.
 - 2. Access to the site.
 - 3. Areas permitted for storage of materials and debris.
 - 4. Areas permitted for the location of cranes, hoists and chutes for loading and unloading materials to and from the roof.
- B. Interior stairs or elevators may not be used for removing debris or delivering materials, except as authorized by the building superintendent.

1.07 EXISTING CONDITIONS

A. If discrepancies are discovered between the existing conditions and those noted on the drawings, immediately notify the owner's representative by phone and solicit the manufacturer's approval prior to commencing with the work. Necessary steps shall be taken to make the building watertight until the discrepancies are resolved.

1.08 JOB SITE PROTECTION

A. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing

application.

- B. During the roofing contractor's performance of the work, the building owner will continue to occupy the existing building. The contractor shall take precautions to prevent the spread of dust and debris, particularly where such material may sift into the building. The roofing contractor shall provide labor and materials to construct, maintain and remove necessary temporary enclosures to prevent dust or debris in the construction area(s) from entering the remainder of the building.
- C. Do not overload any portion of the building, either by use of or placement of equipment, storage of debris, or storage of materials.
- D. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.
- E. Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains, if required. At completion, test drains to ensure the system is free running and drains are watertight. Remove strainers and plug drains in areas where work is in progress. Install flags or other telltales on plugs. Remove plugs each night and screen drain.
- F. Store moisture susceptible materials above ground and protect with waterproof coverings.
- G. Remove all traces of piled bulk materials and return the job site to its original condition upon completion of the work.

1.09 SAFETY

A. The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. Safety shall be the responsibility of the roofing contractor. All related personnel shall be instructed daily to be mindful of the full time requirement to maintain a safe environment for the facility's occupants including staff, visitors, customers and the occurrence of the general public on or near the site.

1.10 WORKMANSHIP

- A. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.
- B. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.
- C. There shall be a supervisor on the job site at all times while work is in progress.

1.11 QUALITY ASSURANCE

- A. The manufacturer must have a minimum of 20 years experience in the manufacturing of vulcanized thermal set sheeting.
- B. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.
- C. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years

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successful experience installing single-ply EPDM roofing systems and having installed at least one (1) roofing application or several similar systems of equal or greater size within one year.

- E. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and experienced superintendent on the job at all times roofing work is in progress.
- F. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the specifier. Any deviation from the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the specifier's consideration.
- G. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.

1.12 JOB CONDITIONS, CAUTIONS AND WARNINGS

Refer to Manufacturers Fully Adhered Roofing System specification, - Application, for General Job Site Considerations.

- A. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.
- B. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.
- C. When loading materials onto the roof, the Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.
- D. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.
- E. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.
- F. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.
- G. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
- H. New roofing shall be complete and weathertight at the end of the work day.
- I. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

1.13 WARRANTY

A. Provide manufacturer's 20 year Membrane System Warranty covering both labor and material with no

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- dollar limitation. The maximum wind speed coverage shall be peak gusts of 120 mph measured at 10 meters above ground level.
- B. Pro-rated System Warranties shall not be accepted.
- C. Evidence of the manufacturer's warranty reserve shall be included as part of the project submittals for the specifier's approval.

PART 2 PRODUCTS

- 2.01 GENERAL
 - A. The basis of design for all components of the specified roofing system shall be products of Carlisle SynTec Incorporated or accepted by the Architect as compatible.
 - 1. Firestone Building Products.
 - B. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, all products (including insulation, fasteners, fastening plates and edgings) must be manufactured and supplied by the roofing system manufacturer and covered by the warranty.
 - C. Submit written request for approval of substituation per section 016000.

2.02 MEMBRANE

Furnish Sure-Seal .060 inch thick reinforced EPDM (Ethylene, Propylene, Diene Terpolymer) conforming to the minimum physical properties of ASTM D4637. The membrane shall be manufactured in a single panel with no factory splices to reduce splice intersections.

2.03 INSULATION/UNDERLAYMENT

- A. The first and second layer of insulation shall be fully adhered to the substrate in accordance with the manufacturer's published specifications.
- B. Insulation shall be, 6" Polyisocyanurate Board Insulation. ASTM C 1289, Type II, Grade 2, felt or glass fiber mat facer on both sides. Compressive Strength: 25 psi, Size 48x96 inches.
 - 1. Carlisle SynTec
 - 2. Firestone Building Products
 - 3. Johns Manville
- C. Water-resistant and silicone treated gypsum panel with embedded fiberglass facer on both sides, and pre-primed on one side. GP Gypsum Dens-Deck, distributed by Carlisle.
 - 1. Board Thickness: 5/8 inch (15mm).
- D Moisture-, mold- and impact-resistant,. USG Securock, Glass Mat Gypsum Panel distributedby Carlisle.
 - 1. Board Thickness: 1/2 inch (6mm).

All products shall be furnished by Carlisle and specifically formulated for the intended purpose.

- A. Bonding Adhesive: Sure-Seal 90-8-30A
- B. Splicing Cement: Sure-Seal EP-95 Splicing Cement
- C. Splice Tape and Primer: Sure-Seal SecurTAPE and HP-250 Primer
- D. Cleaning Solvent: Sure-Seal Splice Cleaner or Weathered Membrane Cleaner
- E. Internal seam sealant: Sure-Seal In-Seam Sealant
- F. External seam sealant: Sure-Seal Lap Sealant
- G. Sealer: Sure-Seal Pourable Sealer

2.05 RELATED MATERIALS

- A. Povide all Carlisle approved related flashings, adhesives and to provide a watertight assemble qualifying for the above stated warranty reqirements.
- 2.06 METAL EDGING AND MEMBRANE TERMINATIONS
 - A. Provide all metal edging and terminations as defined in drawings. Color as selected by Architect.

2.07 OTHER MATERIALS

- A. Provide 5/8" "Dens-Deck" over all metal decks.
- B. Provide "Grace Ice and Water Shield" over MR GWB at steel decks.
- C. Provide "Grace Ice and Water Shield" over all wood decks.
- D. Provide 1/2" "Dens-Deck" recovery board over all insulation.
- E. Provide spray applied galvanizing to underside of all fasteners penetrating metal decking.

PART 3 EXECUTION

3.01 GENERAL

- A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.
- B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

3.02 INSULATION PLACEMENT

A. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints both horizontally and vertically if multiple layers are provided.

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B. Secure insulation to the substrate with the required adhesive in accordance with the manufacturer's specifications.

3.03 MEMBRANE PLACEMENT AND ATTACHMENT

- A. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour prior to application. Provide and secure both perimeter and field membrane sheets in accordance with the manufacturer's most current specifications and details.
- B. Secure the membrane with Carlisle approved adhesion system.
- C. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's specifications.

3.04 MEMBRANE SPLICING (Adhesive Splice)

- A. Membrane splices must be a minimum of 6 inches wide where mechanical attachment is required along the length of the membrane. Membrane splices at the end roll sections (the width of the membrane) must be a minimum of 3 inches wide.
- B. When using PRE-KLEENED Reinforced EPDM Membrane, cleaning the splice area is not required unless contaminated with field dirt, adhesive or other residue. To remove accumulated dirt, footprints, etc., scrub the membrane sheets with Splice Cleaner or HP-250 Primer.
- C. Apply Splicing Cement and In-Seam Sealant in accordance with the manufacturer's specifications and roll the top sheet onto the mating surface.
- D. Roll the splice with a 2 inch wide steel roller and wait at least 2 hours before applying Lap Sealant to the splice edge following the manufacturer's requirements.
- E. Field splices without In-Seam Sealant must be overlaid with uncured flashing.

3.05 MEMBRANE SPLICING (Tape Splice)

- A. Tape splices where fastening plates are located (along the length of the membrane) must utilize 6 inch wide Splice Tape. Tape splices at end roll sections (along the width of the membrane without fastening plates) shall utilize 3 inch wide Splice Tape.
- B. Overlap adjacent sheets and mark a line 1/2 inch out from the top sheet.
- C. Apply Sure-Seal HP-250 Primer to splice area.
- D. Position Splice Tape onto bottom membrane sheet with the edge of the release film along the marked line.
- E. Remove the release film and press the top sheet onto the tape using hand pressure. Roll the splice with a 2 inch wide steel roller.
- F. Install a 6 inch wide section of Pressure-Sensitive Flashing or Elastoform Flashing over all field splice intersections and seal edges of flashing with Lap Sealant.
- G. The use of Lap Sealant with tape splices is optional except at tape overlaps and cut edges of reinforced membrane where Lap Sealant is required.

3.06 FLASHING

- A. Wall and curb flashing shall be cured EPDM membrane. Continue the deck membrane as wall flashing where practicable.
- B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.07 WALKWAYS

- A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the specifier's drawing.
- B. Adhere walkways to the EPDM membrane in accordance with the manufacturer's specifications.

3.08 DAILY SEAL

- A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
- B. Use Sure-Seal Pourable Sealer or other acceptable membrane seal in accordance with the manufacturer's requirements.

3.09 CLEAN UP

- A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
- B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SECTION

SECTION 07 62 00

FLASHING AND TRIM

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Roof copings, reglets and counterflashings.
 - 2. Exterior door drip flashings.
 - 3. Miscellaneous flashings.
- B. Related Work Specified Elsewhere:
 - 1. Concrete Masonry Units
 - 2. Joint Sealers
 - 3. Hollow Metal Doors and Frames
 - 4. Painting
- C. References:

1. American Society for Testing and Materials (ASTM):

- a. A525-86 Steel Sheet, Zinc Coated, Galvanized by the Hot Dip Process.
- b. B32-87 Solder Metal
- c. D226-87 Asphalt Saturated Organic Felt Used in Roofing and Waterproofing.
- d. D1187-82 Asphalt Based Emulsions for Use as Protective Coatings for Metal.
- 2. Federal Specifications (FS): O-F-506 Flux, Soldering, Paste and Liquid.

3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): SMACNA Architectural Sheet Metal Manual.

1.02 SYSTEM DESCRIPTION

A. Work of this Section is to physically protect composition or flexible roof flashing and building components from damage that would permit water leakage to building interior.

1.03 QUALITY ASSURANCE

- A. Applicator: Company specializing in sheet metal flashing work with 3 years minimum experience.
- 1.04 SUBMITTALS
 - A. Submit shop drawings, product data, installation instructions, color sample, and samples under provisions of Section 013400.
 - B. Describe material profile, jointing pattern, jointing details, fastening methods, and installation details.
 - C. Provide 12 in. length of full sized sample of metal flashings illustrating typical external corner, internal corner, junction to vertical dissimilar surface, material and finish.

DIVISION 07

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Section 042000 Section 079000 Section 081110

Section 099000

1.05 STORAGE AND HANDLING

- A. Store products under provisions of Section 016200.
- B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation.
- C. Prevent contact with materials during storage which may cause discoloration, staining or damage.

1.06 PERFORMANCE AGREEMENT

- A. Provide two-year guaranty under provisions of Section 017500, substantially in the following form:
 - Inspect and make emergency repairs to defects and leaks in building flashings within 24 hours of notice by Owner. As soon as weather permits, make permanent repairs and restore effected area to standards of contract requirements. Work shall be done without additional cost to Owner, unless leaks were caused by abuse or unusual natural phenomena as lightning strikes or hurricane.
- B. Provide 20-year manufacturer's finish warranty for prefinished items under provision of Section 017500.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Galvanized Sheet Stock: ASTM A446, Grade C minimum; coating designation G90 in conformance with A525, or 1.9 mil Zincalume coating composed of 45 percent zinc and 55 percent aluminum alloy by weight, per ASTM A792.
- B. Counterflashings:
 - 1. Manufactured: Provide counterflashings similar and equal to Springlok Flashing System as manufactured by Fry Reglet Corp. Flashing shall be made of 26 ga. galvanized steel. Prefinish where exposed to view form exterior grade and elsewhere as indicated. Flashing shall have a 3 in. factory formed end lap. Provide with prefabricated flashing corners and accessories.
 - 2. Fabricated: Provide counterflashings of galvanized steel as indicated, thickness shown. Pre-finish where exposed to view from exterior grade and elsewhere as indicated. Fabricate as specified below, to shapes shown and as required to maintain building watertight and weatherproof.
- C. Copings: Provide copings of preformed, galvanized sheet stock as indicated, thickness shown. Fabricate as specified below, to shapes shown and as required to maintain building watertight and weatherproof.

2.02 ACCESSORIES

A. Fastener: Galvanized steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.

- B. Underlayment: ASTM D266; No. 15 asphalt saturated roofing felt.
- C. Metal Primer: FS TT-P-641.
- D. Protective Backing Paint: Bituminous, conforming to ASTM D1187, Type A.
- E. Sealant: Refer to Section 07900.
- F. Solder: ASTM B32; 50/50 type.
- G. Flux: FS O-F-506.

2.03 FABRICATION

- A. Form section true to shape, accurate in size, square, and free from distortion or deflects.
- B. Form pieces in longest practicable lengths. Minimum bend radius 2.5 times the thickness of the metal, unless more stringent requirements are specified by coating manufacturer. Form bends at room temperature.
- C. Hem exposed edges on underside 1/2 in.; miter and rivet lap seam corners. Provide sealant in laps as specified in Section 07900.
- D. Form material with cover plate seams.
- E. Where indicated, and at all corner installations, solder and seal metal joints. After soldering, remove flux. Wipe and wash solder joints clean.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 in. and hemmed to form drip.
- G. Provide 24 gauge coping with 22 gauge continuous concealed cleats on exterior face and exposed screw fasteners on interior face, as shown.

2.04 FINISH

- A. Shop prepare and prime exposed ferrous metal surfaces, including galvanized.
- B. Backpaint concealed ferrous metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.
- C. Exposed flashings at sloped glazing to match sloped glazing framing color.
- D. Exposed flashings at louvers to match louver color.
- E. Prefinishing of Sheet Stock:
 - Exterior surfaces of prefinished flashings shall have a shop applied baked-on epoxy primer (.2 mil) and a baked-on PVF 2 (Polyvinylidene Flouride) finish coat (.8 mil) equal to Glidden "Nubelar", DeSoto "Fluropon", Whittaker "Fluoroceram" and PPG "Duranar"; full 70% Kynar 500, totaling a nominal 1.0 mil dry film thickness.
 - 2. Interior finish consists of .15 mil epoxy primer and .35 mil off-white backer, except match exterior surface finish where exposed.

- F. Touch Up Finishes: Touch up finish or refinish hardware items and small scratches and abrasions on prefinished metal with an air dry fluorocarbon refinishing system or touch up system, similar and equal to ADS Kynar.
- G. Back paint concealed metal surfaces and dissimilar metal contact surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

PART 3 EXECUTION

3.01 INSPECTION

A. Beginning of installation means installer accepts existing substrates.

3.02 PREPARATION

A. Field measure site conditions prior to fabricating work.

3.03 INSTALLATION

- A. Install surface mounted reglets and accessories true to lines and levels, at wall/roof connections above top of base flashings.
 - 1. Seal top of reglet as specified in Section 07900 and in accordance with reglet manufacturer's recommendations.
 - 2. Place beads of sealant under holes. Prefinish reinforcing bars to match flashing. Anchor bars to substrate through flashing with round head bolts with neoprene washers into sleeve anchors, of metal compatible with flashing and with heads prefinished color to match flashing.
- B. Secure flashings in place using concealed fasteners unless exposed specifically shown. Fastener size and type suitable for conditions of use. Provide sizes and spacings shown, and where not shown, provide in accordance with applicable requirements of SMACNA manual and FM 1-49 for Wind Zone 2 whichever is the more stringent for the application.
- C. Provide butt joints between coping lengths with minimum 22 ga. cover plates and seal between cover plates and coping with two beads of polyisobutylene sealant each side (four rows of sealant total for each covered joint). Allow for expected expansion and contraction between coping lengths.
- D. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight. Apply sealant between metal flashings as specified in Section 079000.
- F. Conform to drawing details included in SMACNA manual where referenced or where applicable to conditions and not in conflict with Contract Documents.

END OF SECTION

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SECTION 07 72 00

ROOF HATCH

PART 1 GENERAL

1.01 SUMMARY

- A. Work included:
 - 1. Furnishing and installing factory fabricated roof hatches

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM), 100 Bar Harbor Drive, West Conshocken, PA 19428-2959; (610) 832-9585, fax (610) 832-9555
 - 1. ASTM A 36-93a: Standard Specification for Structural Steel

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's product data for all materials in this specification.
- B. Shop Drawings: Show profiles, accessories, location, and dimensions.
- C. Samples: Manufacturer to provide upon request; sized to represent material adequately.
- D. Contract Closeout: Roof hatch manufacturer shall provide the manufacturer's Warranty prior to the contract closeout.

1.04 PRODUCT HANDLING

- A. All materials shall be delivered in manufacturer's original packaging.
- B. Store materials in a dry, protected, well-vented area. The contractor shall thoroughly inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.
- C. Remove protective wrapping immediately after installation.

1.05 SUBSTITUTIONS

A. As per Substitutions Section 016300.

1.06 JOB CONDITIONS

- A. Verify that other trades with related work are complete before installing roof hatch(s).
- B. Mounting surfaces shall be straight and secure; substrates shall be of proper width.
- C. Refer to the construction documents, shop drawings, and manufacturer's installation instructions.

- D. Coordinate installation with roof membrane and roof insulation manufacturer's instructions before starting.
- E. Observe all appropriate OSHA safety guidelines for this work.

1.07 WARRANTY

A. Manufacturer's standard warranty: Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge. Electrical motors, special finishes, and other special equipment (if applicable) shall be warranted separately by the manufacturers of those products.

PART 2 PRODUCTS

- 2.01 MANUFACTURER
 - A. The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-203-934-6363, Fax: 1-203-933-8478, Web: www.bilco.com

2.02 ROOF HATCH

- A. Furnish and install where indicated on plans metal roof hatch Type E, size width: 3'0" (914mm) x length: 3'0" (914mm). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.
- B. Performance characteristics:
 - 1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m2) with a maximum deflection of 1/150th of the span or 20 psf (97 kg/m2) wind uplift.
 - 2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 - 3. Operation of the cover shall not be affected by temperature.
 - 4. Entire hatch shall be weathertight with fully welded corner joints on cover and curb.
- C. Cover: Shall be 11 gauge aluminum with a 3" (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
- D. Cover insulation: Shall be fiberglass of 1" (25.4mm) thickness, fully covered and protected by a metal liner [select: 22 gauge paint bond G-90 galvanized steel or 18 gauge aluminum].
- E. Curb: Shall be 12" (305mm) in height and of 11 gauge aluminum. The curb shall be formed with a 3-1/2" (89mm) flange with 7/16" (11.1mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip[®] flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.

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- F. Curb insulation: Shall be rigid, high-density fiberboard of 1" (25.4mm) thickness on outside of curb.
- G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe through bolted to the curb assembly.
- H. Hardware
 - 1. Heavy pintle hinges shall be provided.
 - 2. Cover shall be equipped with a spring latch with interior and exterior turn handles.
 - 3. Roof hatch shall be equipped with interior and exterior padlock hasps.
 - 4. The latch strike shall be a stamped component bolted to the curb assembly.
 - 5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25.4mm) diameter red vinyl grip handle to permit easy release for closing.
 - 6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be Type 316 Stainless Steel.
 - 7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- I. Finishes: Factory finish shall be mill finish aluminum.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that roof hatch installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Report and correct defects prior to any installation.

3.02 INSTALLATION

- A. Submit product design drawings for review and approval to the architect or specifier before fabrication.
- B. The installer shall check as-built conditions and verify the manufacturer's roof hatch details for accuracy to fit the application prior to fabrication. The installer shall comply with the roof hatch Manufacturer's installation instructions.
- C. The installer shall furnish mechanical fasteners consistent with the roof requirements.

END OF SECTION

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SECTION 07 72 93

VENTED SOFFIT PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes complete system of concealed-fastener, lap-seam soffit metal panels.
- B. Edit list of related sections for project requirements. Section numbers and titles are those recommended in CSI MasterFormat; revise numbers and titles to reflect actual sections in Project Manual.
- C. Related Requirements:
 - 1. Section 05 12 00: Structural Steel Framing.
 - 2. Section 05 40 00: Cold-Formed Metal Framing.
 - 3. Section 07 26 00: Vapor Retarders.
 - 4. Section 07 92 00: Joint Sealants.

1.2 REFERENCES

- A. Reference Standards:
 - 1. ASCE 7: Minimum Design Loads for Buildings and Other Structures.
 - 2. ASTM A653: Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
 - 3. ASTM A792: Steel Sheet, 55 % Aluminum Zinc Alloy Coated by the Hot Dip Process.
 - 4. ASTM C1371: Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
 - 5. ASTM C1549: Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 - 6. ASTM D523: Specular Gloss.
 - 7. ASTM E283: Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 8. ASTM E331: Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 - 9. ASTM E1592: Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 - 10. ASTM E1918: Measuring Solar Reflectance of Horizontal and Low Sloped Surfaces in the Field.
 - 11. ASTM E1980: Calculating Solar Reflectance Index of Horizontal and Low Sloped Opaque Surfaces.
 - 12. CRRC-1 Method #1: Measuring Solar Reflectance of a Flat, Opaque, and Heterogeneous Surface Using a Portable Solar Reflectometer.
 - 13. SMACNA Architectural Sheet Metal Manual.

1.3 SUBMITTALS

- A. Product Data.
- B. Shop Drawings:
 - 1. Indicate thickness and dimensions of parts, fastenings and anchoring methods, details and locations of joints, transitions and other provisions necessary for thermal expansion and contraction.
 - 2. Indicate locations of field- and factory-applied sealant.

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- C. Samples:
 - 1. Submit two samples, 12 inches long by full panel width, showing proposed metal thickness and seam profile.
 - 2. Submit standard color samples of metal for Architect's selection.
- D. Manufacturer Qualifications.
- E. Installer Qualifications: Submit list of completed projects, with names and contact information for architects and contractors.
- F. Test Reports: Indicating compliance of products with project requirements.
- G. Warranty Documentation.
- H. Insurance Documentation.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Ten years' experience, minimum, in factory fabrication of metal panels.
- B. Installer Qualifications:
 - 1. Three years' experience, minimum, in application of metal roof or wall panels.
 - 2. Five satisfactory projects with metal panel work of similar scope and complexity to Work of this Project.
- C. Testing Agency Qualifications: Agency compliant with ISO/IEC Standard 17025, or an accredited independent agency recognized by the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement or ANSI.
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - A. Storage and Handling Requirements:
 - 1. Keep panels and accessory items dry.
 - 2. Protect against damage and discoloration.
 - 3. Handle panels with non-marring slings.
 - 4. Support panels to prevent permanent deformation.
 - 5. Store panels above ground, with one end elevated for drainage.
 - 6. Protect panels against standing water and condensation between adjacent surfaces.
 - 7. If panels become wet, immediately separate sheets, wipe dry with clean cloth, and keep sheets separate for air-drying.
 - 8. Painted panels shall be shipped with protective plastic sheeting or a strippable film coating between panels. Remove strippable film coating prior to installation. Do not allow strippable film coating to remain on panels in extreme heat, cold, or direct sunlight or other UV source.
- 1.6 WARRANTY
 - A. Manufacturer's Warranty: Manufacturer's standard 25-year performance warranty, stating the following:
 - 1. Architectural fluorocarbon finish:
 - a. Will be free of fading or color change in excess of 5 Hunter delta-E units as determined by ASTM D2244-02.

- b. Will not chalk in excess of numerical rating of 8 when measured in accordance with standard procedures specified in ASTM D4214-98 method D659.
- c. Will not peel, crack, chip, or delaminae.
- d. Metal substrate will not rupture, fail structurally, or perforate.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Products:

- 1. AEP Span, a Division of ASC Profiles; Vented Flush Panel
- B. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 01 63 00 "Product Options and Substitutions "

2.2 PANELS

- A. Panel: AEP Span, a Division of ASC Profiles; Vented Flush Panel
 - 1. Material: Steel conforming to ASTM A792.
 - a. 24 Gauge: Yield strength 50,000 psi; with aluminum-zinc alloy coating conforming to ASTM A792, Class AZ50.
 - 2. Profile and Pattern:
 - a. Vented Perforated Flush Panel with no ribs
 - 3. Finishes:
 - a. Exterior Panel Finish: Provide primer and finish coat on exposed faces; provide backer coat on concealed faces of panels.
 - DuraTech® 5000: Polyvinylidine Fluoride, full 70 percent Kynar 500/Hylar 5000, consisting of a baked-on 0.15-0.30 mil corrosion resistant primer and a baked-on 0.70-0.80 mil finish coat with a specular gloss of 8 to 15 when tested in accordance with ASTM D523 at 60 degrees.
 - 2) Color: Provide rull range of color samples for architects selection. Each Soffit type shall have the option of its own color. See drawings for soffit types.
 - 4. Side lap Sealant: Factory apply sealant, except where no sealant is required. Field-applied sealant is not acceptable.

2.3 ACCESSORIES

- A. Trims and Flashings: Material, metal thickness, and finish to match panels. Profiles indicated in Drawings.
- B. Panel Penetration Flashings: As recommended by panel manufacturer.
- C. Fasteners: Per manufacturer recommendation.
- D. Profile Closures: Polyethylene foam, die-cut or formed to panel configuration.
E. Sealant for Field Application: See Section 07 92 00 "Joint Sealants".

2.4 FABRICATION

- A. Fabrication, General:
 - 1. Unless otherwise shown on Drawings or specified herein, fabricate panels in continuous lengths and fabricate flashings and accessories in longest practical lengths.
 - 2. Panels shall be factory correctively-leveled.
- B. Fabrication Tolerances:
 - 1. Flat metal surfaces will display waviness commonly referred to as "oil canning". This is caused by steel mill tolerances and is a characteristic, not a defect, of panels manufactured from light gauge metal. Panels are factory correctively-leveled to minimize the occurrence of "oil canning". As such, "oil canning" will not be accepted as cause for rejection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: With Installer present.
 - 1. Examine conditions and substrates on which metal panels are to be installed. Structural support or substrate shall be flat and plumb to avoid panel stresses and distortion.
 - 2. Prior to starting work, correct defects.
- B. Field Measurements:
 - 1. Coordinate field measurements and fabrication schedule with construction progress.
 - 2. Field measure prior to fabrication. Show recorded dimensions on shop drawings, including locations of shop-fabricated openings.
 - 3. If field measurements differ from drawing dimensions, notify Architect prior to fabrication.
- C. Tolerances: Deviations from flat plane shall not exceed the following.
 - 1. 1/4 inch in 20 feet vertically or horizontally.
 - 2. 1/2 inch across building elevation.
 - 3. 1/8 inch in 5 feet.

3.2 PREPARATION

A. Protection:

- 1. Treat contacting surfaces of dissimilar materials to prevent electrolytic corrosion.
- 2. Where panels or trim may come in contact with dissimilar materials or treated lumber, fabricate transitions to facilitate drainage and minimize possibility of galvanic corrosion.
- 3. At points of contact with dissimilar metal or treated lumber, coat panel or trim with protective paint or separate materials with a weatherproof underlayment.
- 4. Direct contact or run-off from CCA, ACQ, AC, or other treated lumber (outdoor wood) or fire retardant impregnated or treated wood shakes or siding can cause panels and trim to fail prematurely. Avoid contact with these materials.
- 3.3 INSTALLATION
 - A. Panels and Flashing:

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- 1. Install according to approved shop drawings.
- 2. Comply with methods and recommendations of SMACNA Architectural Sheet Metal Manual for flashing configurations required.
- 3. Overlap flashing at least 6 inches.
- 4. Discrepancies between job site conditions and shop drawings shall be brought to the attention of the Architect for resolution.
- 5. Cutting and Fitting:
 - a. Cut panels neat, square, and true with shearing action cutters. Torch or power saw cutting is prohibited.
 - b. Openings 6 inches and larger: Shop fabricate and reinforce to maintain original load capacity.
 - c. Openings less than 6 inches: Field cutting is acceptable.
- B. Accessories: Install trims, panel closures, flashings according to Drawings and manufacturer's recommended details.
- C. Sealant Installation: Apply according to approved shop drawings and SMACNA Architectural Sheet Metal Manual recommendations.

3.4 CLEANING

- A. Repairs:
 - 1. Touch up paint is not required for panels with scratches that do not expose metal.
 - 2. Panels or flashings with finish damage exposing metal or with substrate damage shall be replaced.
- B. Cleaning and Waste Management: See Division 01 Section "Construction Cleaning". At completion of each day's work and at work completion, sweep panels, flashings, and gutters clean. Do not allow fasteners, cuttings, filings, or scraps to accumulate.

END OF SECTION

SECTION 07 90 00

JOINT SEALANTS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Clean and prepare sealant substrate surfaces.
 - 2. Sealant and backing.
- B. Related Work Described Elsewhere:
 - Cast-In-Place Concrete Section 033000 1. Concrete Masonry Unit 2. Section 042000 Vapor Retarders Section 071900 3. 4. Flashing and Metal Trim Section 076200 5. Hollow Metal Doors and Frames Section 081110 Glazing Section 088000 6. Gypsum Wallboard 7. Section 092500 Acoustical Ceilings 8. Section 095110
- C. References:
 - 1. American Society for Testing and Materials (ASTM):
 - a. C790-84 Recommended Practices for Use of Latex Sealing Compounds.
 - b. C804-83 Recommended Practices for Use of Solvent Release Type Sealants.
 - c. D1056-85 Flexible Cellular Materials Sponge or Expanded Rubber.
 - d. D1565-81 (1986) Flexible Cellular Materials Vinyl Chloride polymers and Copolymers (Open Cell Foam).
 - e. E119-83 Fire Tests of Building Construction Materials.
 - 2. Federal Specifications (FS):
 - a. TT-S-001543 Sealing Compound, Silicone Rubber Base.
 - b. TT-S-001657 Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type.
 - c. TT-S-00227 Sealing Compound: Elastromeric Type , Multi-Component.
 - d. TT-S-00230 Sealing Compound: Elastromeric Type, Single-Component.

1.02 SUBMITTALS

- A. Submit product data and samples under provision of Section 013400.
- B. Submit product data and samples of each sealant type and sealant colors.
- C. Submit manufacturer's surface preparation and installation instructions under provisions of Section 013400.

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1.03 EXTRA STOCK

- A. Furnish tube or equivalent of each type of sealant used on this project under provisions of Section 017500.
- B. Turn over to Owner's Representative at Substantial Completion and receive a receipt therefore.

PART 2 PRODUCTS

2.01 SEALANT MATERIALS

- A. Silicone Sealant: Silicone base, single component, moisture curing, non-sagging, non-staining, non-bleeding; color as selected; conforming to the requirements of FS TT-S-001543A, Class A. Dow Corning 795 Sealant, GE Gesil N 2600, or Tremco Spectrum 2.
 - 1. Dynamic Movement Capability + 50 percent.
 - 2. Service Temperature Range -35 to +140 degrees F.
 - 3. Shore A Hardness Range 15 to 35.
- B. Polyurethane Sealant: Moisture curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging type; conforming to the requirements of FS TT-S-00230C, Type 11, Class A. Sonneborn Sonolastic NP II, Tremco Dymeric. Color as selected.
 - 1. Dynamic Movement Capability + 25 percent.
 - 2. Service Temperature Range -60 to +180 degrees F.
 - 3. Shore A Hardness 20 to 35.
- C. Butyl Sealant: Butyl rubber base, single component, conforming to requirements of FS TT-S-001657, Type 1; Shore A hardness of maximum 30; non-staining; non-bleeding; non-sagging; color as selected. Tremco Butyl Sealant, Pecora BC-158, or Sonneboren Butakauk.
- D. Acrylic Sealant: Acrylic base, single component, solvent curing, capable of being continuously immersed in water, withstand movement of up to 7.5 percent of joint width and paintable. Tremco Acrylic Latex Caulk or Sonneborn Sonolac.
- E. Accoustical Sealant: Conforming to ASTM C-919, Smoke & Sound Sealant. Tremco Tremflex 834.
- F. Sealant Tape: AAMA 804.1, Butyl-polyisobutylene preformed sealant, service temperature range -40 to 200 degrees F; color as selected; Tremco 440 tape, PTI 606, or acceptable substitute. Provide pre-shimmed where required.
- G. Penetration Sealant: Conform to requirements of ASTM E119 or ASTM E 814; provide materials UL Listed with assembly and for equal rating. Seal walls and floors at pipe, conduit and cable penetrations. Where required for rating, provide with mineral wool of ceramic fiber forming material listed. Dow Corning 2000 Fire Stop Sealant, GS Pensil 851, or equal.
- H. Sanitary Sealant: Dow Corning 786 mildew resistant silicone sealant of GE SCS 1702 Sanitary Sealant. Seal joints around plumbing fixtures.
- I. Rated Joint Sealant: Conform to requirements of ASTM E119 or UL 263; provide material UL listed with assembly and for equal rating. Seal walls at control joints in 2 hour CMU or concrete walls. Where required for rating, provide with mineral wool or ceramic fiber forming material listed. Dow Corning 795, Tremco Dymeric, or equal.

- J. Traffic Sealant: Two component, self-leveling type; conforming to the requirements of FS TT-S-00227E, Type I, Class A and ASTM C920 Type S, Grade P, Class 25, Use T; Sonneborn Sonolastic Paving Joint Sealant, Tremco THC-900, "Chem-Calk 550" by Bostik, or equal. Color as selected.
- K. Substitutions: Refer to Section 016300 for substitution procedures.

2.02 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Filler (Backer Rod): Round, open cell polyurethane foam rod; oversized 30 to 50 percent larger than joint width; compatible with joint sealer.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 JOB CONDITIONS

- A. Verify joint openings are ready to receive work and field measurements are as shown on Drawings and recommended by manufacturer.
- B. Beginning of installation means installer accepts existing substrate.

3.02 PREPARATION

- A. Clean, prepare, and size joints in accordance with manufacturer's instructions. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Verify that joint shaping materials and release tapes are compatible with sealant.
- C. Examine joint dimensions and size materials to achieve required width/depth rations.
- D. Use joint filler to achieve required joint width/depth rations. Provide neck dimension no greater than 1/3 joint width. Verify that joint backing and release tapes are compatible with sealant. Do not puncture backer rod.
- E. Use bone breaker where joint backing is not used.
- F. Perform preparation in accordance with ASTM C804 for solvent release and C790 for latex base sealants as applicable.
- G. Protect elements surrounding the work of this Section from damage or disfiguration.

3.03 INSTALLATION

- A. Perform work in accordance with ASTM C804 for solvent release and C790 for latex base sealants as applicable.
- B. Install sealant per manufacturer's instructions.
- C. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature ranges.
- D. Tool joints concave.
- E. Joint: Free of air pockets, foreign embedded matter, ridges, and sags.
- 3.04 CLEANING AND REPAIRING
 - A. Clean work under provisions of Section 017100.
 - B. Clean adjacent soiled surfaces.
 - C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.05 PROTECTION OF FINISHED WORK

- A. Protect finished installation under provisions of Section 015000.
- B. Protect sealants until cured.
- 3.06 SCHEDULE

Location:

- A. Concrete Masonry
 - Exterior Control Joints Exterior Penetrations Interior Control Joints
- B. Vapor Retarder (Reference Section 07190)

Floor/Roof Penetrations

C. Flashing and Metal Trim (Ref. Section 07620)

Metal/Metal (concealed) Metal/Metal (exposed) Metal/CMU

D. Windows (Ref. Sections 08520)

Cap Glazing Bead Heel Glazing Bead Metal/Metal Flashing lap Joints (concealed) Exterior Perimeter/Metal (exposed) Exterior Perimeter/CUM (exposed) Silicone Weather Seal Silicone Structural Sealant Tape Sealant Polyurethane Polyurethane

Type:

Acrylic

Acrylic

Silicone

Sealant Tape

Polyurethane

Polvurethane

Polyurethane Rated Joint Sealant

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	Sill/Flashing (concealed) Wood/Wood (exposed) Structural Glazing Interior Perimeter/Metal (exposed)	Butyl Polyurethane Silicone Acrylic
E.	Door and Relite Frames	
	Interior Door and Relite Frames/Walls Exterior Door and Relite Frames/CMU Interior Door and Relite Glazing Exterior Door and Relite Glazing Threshold	Acrylic Polyurethane Tape Sealant (pre-shimmed) Tape Sealant (pre-shimmed) Butyl
F.	Tile	
	Fixtures, Fittings and Equipment/Substrate Accessories and Partitions/Substrate Control/Expansion Joints Top of Base at Kitchen	Sanitary Sealant Sanitary Sealant Polyurethane Sanitary Sealant
G.	Penetrations	
H.	Cable, Pipe, & Utility/Rated Floor/Wall Voids Between Rated Wall/Roof Sheathing In Acoustical Walls and Ceilings P. Lam/Gypsum Board	Penetration Sealant Penetration Sealant Acrylic Acrylic
I.	Horizontal Interior Traffic Joints	Traffic Sealant

J. Provide sealants for other joints between material, assemblies, and components not scheduled above as specified in individual Sections. Where not indicated above or called out in individual Sections, provide acceptable sealant best suited to application.

END OF SECTION

SECTION 08 11 10

HOLLOW METAL DOORS AND FRAMES

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Fire rated and non-rated rolled hollow metal doors, panels and frames.
 - 2. Interior light frames, sound doors and frames
 - B. Related Work Described Elsewhere:
 - 1. Concrete Unit Masonry
 - 2. Rough Carpentry:
 - 3. Flashing and Trim
 - 4. Joint Sealants
 - 5. Door hardware:
 - 6. Glazing
 - 7. Painting:
 - C. References:
 - 1. American Society for Testing and Materials ASTM :
 - a) E152-81a Methods for Fire Tests of Door Assemblies.

b) A525-86 General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

Section 042000

Section 061000

Section 076200

Section 079000

Section 087000

Section 088000

Section 099000

- 2. Door Hardware Institute (DHI): The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- 3. National Fire Protection Association (NFPA):
 - a) 80 Fire Doors and Windows
 - b) 252 Fire Tests for Door Assemblies.
- 4. Steel Door Institute (SDI):
 - a) 100-85 Recommended Specifications for Standard Steel Doors and Frames
 - b) 105-82 Recommended Erection Instructions for Steel Frames.
 - c) 111 Recommended Standard Details Steel Doors and Frames
 - d) 113-79 Test Procedure and Acceptance Criteria for Apparent Thermal Performance of Steel Door and Frame Assemblies.
- 5. Underwriters' Laboratories, Inc. (UL): 10B Fire Tests of Door Assemblies.
- 6. National Association of Architectural Metal Manufacturers (NAAMM): Hollow Metal Technical and Design Manual.

1.02 QUALITY ASSURANCE

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- A. Conform to requirements of SDI-100 and NAAMM.
- B. Fire rated door and frame construction: Conform to UL 10B. Fabricate fire rated assemblies in accordance with requirements of Underwriter's Laboratories Inc. (UL).
- C. Installed frame and door assembly: Conform to NFPA 80 for fire rated class indicated in Schedule. Refer to Drawings for Class requirements.
- D. Provide rated double doors tested and approved without astragals.

1.03 SUBMITTALS

- A. Submit complete materials list and shop drawings for all doors and frames, in compliance with Section 013400.
- B. Indicate frame configuration, anchor types and spacing, location of cutouts for hardware, reinforcement, and finish.
- C. Indicate door elevations, internal reinforcement, closure method, insulation, and cutouts for glazing.
- D. Submit manufacturer's certification under provisions of Section 014000. Submit manufacturer's certification that insulated door and frame assemblies proposed have been tested and meet or exceed requirements of SDI-113.
- 1.04 DELIVERY, STORAGE AND HANDLING
 - A. Protect products under provisions of Section 016200.
 - B. Provide packaging such as cardboard or other containers, separators, banding spreaders, and paper wrappings to protect hollow metal items. Protect doors and frames with resilient packaging sealed with heat shrunk plastic.
 - C. Break seal at site to permit ventilation.
 - D. Deliver, store and handle hollow metal work in manner to prevent damage and deterioration and in accord with any special storage and handling requirements of manufacturer.
 - E. Store doors upright, in a protected dry area, at least 1 in. or more off the ground or floor and at least 1 in. between individual pieces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. General: Following products are for general reference only and are subject to compliance with specified requirements.
- B. Exterior Doors:

1.	Curriers	Series:	707N
2.	Amweld	Series:	2700

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	3. 4.	CECO Steelcraft	Series Series	Imperial L-16 (Foam Core)
C.	Interior Doors (except sound doors):			
	1. 2. 3. 4.	Curriers Amweld CECO Steelcraft	Series: Series: Series: Series:	707N & L707N 1700 Imperial/Fuego L-18 (Foam Core)
D.	Interior Sound Doors:			
	1. 2. 3. 4.	Curriers Amweld CECO Steelcraft	Series: Series: Series: Series:	707N & L708N 5300 Imperial/Fuego L-16 (Foam Core)
E.	Exte	rior Frames:		
	1	Curriere	Sorios	Eluch Eramos

Curriers Series: Flush Frames 1. 2. Amweld 400 Series: 3. CECO Series: **CF34** 4. Steelcraft Series: F14 F16

F. Interior Frames in Gypsum Board Partitions:

1.	Curriers	Series:	Flush Frame
2.	Amweld	Series:	400
3.	CECO	Series:	F34
4.	Steelcraft	Series:	F14, F-16

G. Substitutions: Under provisions of Section 016300.

2.02 DOORS AND FRAMES

- A. Exterior and Vestibule Doors: SDI-100 Grade III Model 4, NAAMM 18 ga. minimum face thickness, galvanized, G90 coating designation in accordance with ASTM A525, and insulated. All doors shall have welded seams and backing plates for closers.
- B. Interior Doors: SDI-100 Grade II Model 4, NAAMM 18 ga. minimum face thickness. All doors shall have welded seams and backing plates for closers.
- C. Exterior and Vestibule Frames: Full miter welded 16 ga. galvanized, G90 coating designation.
- D. Interior Frames: Full miter welded 16 ga. G90 galvanized.

2.03 DOOR CORE

- A. Exterior Doors:
 - 1. Core: Polystyrene or polyurethane foam.
 - 2. Maximum "U" factor: .014.

B. Interior Doors:

1. Core: Polystyrene or polyurethane foam where acceptable for rated and non-rated doors, except provide mineral fiberboard cores where required for fire rating.

2.04 ACCESSORIES

- A. Metal Filler Panels: SDI-100 Grade III Model 2, 16 ga. minimum face thickness, 1-3/8 in. panel thickness, galvanized to G90 coating designation in accordance with ASTM A525, with polystyrene or polyurethane foam core.
- B. Rubber Silencers: Products of door manufacturer, Glynn Johnson, Builders Brass, Quality, Ives, or Russwin.
 - 1. Provide three for each single door frame; two for each pair of door frames without mullion; and three for each door in a pair of doors frame with a mullion.
 - 2. Type: Removable, suitable for metal frames, similar and equal to Glynn Johnson GJ64.
 - 3. Install prior to grouting frames, or make provisions to accommodate installation of silencers.
- C. Filler Panel and Applied Glazing Stops: Rolled steel channel shape, 18 Ga. mitered corners made to a close neat fit; secured with countersunk tamperproof sheet metal screws at minimum 12 in. intervals at glass lites, secured with countersunk style tamperproof sheet metal screws at minimum 6 in. intervals at filler panels. Provide stops with UL label in rated doors and frames.
- D. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat phillips heads for exposed screws and bolts.
- E. Provide anchor types as required for positive fastening to adjacent construction and to comply with scheduled fire label requirements.
- F. Provide Curries/Essex 6" high Terminated Stops at all hollow metal doors.

2.05 PROTECTIVE COATINGS

A. Primer: Manufacturer's standard baked-on primer, suitable for finish paint specified under Section 099000.

2.06 FABRICATION

- A. Fabricate frames as follows:
 - 1. Exterior frames shall be thermal break type, fabricated with closed cell polyethylene foam, polyvinyl chloride, or other thermal barrier material standard with manufacturer between interior and exterior frame surfaces. Frame connection between jamb and head shall be fully welded, ground smooth and galvanizing touch-up. Frames shall be prepared for plate and pipe or butterfly existing opening type anchors. Coordinate with Section 07214.
 - 2. Fabricate galvanized frames as full miter welded unit type. Frame connection between jamb and head shall be fully welded and seamless. Accurately cope and securely weld butt joints of mullions of glazed lights. Grind welded joints to smooth uniform finish. Provide with 4 in. face at head as required for masonry wall coursing.

- B. Fabricate frames and doors with hardware reinforcement plates welded in place. Provide mortar guard boxes, minimum 26 ga.
 - 1. Hinge reinforcement: Minimum 10 ga.
 - 2. Closer reinforcement: Minimum 12 ga.
 - 3. Lock reinforcement: Minimum 14 ga.
 - 4. Finish Hardware Preparation: Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final finish hardware schedule and templates provided by hardware supplier, surface applied hardware preparations provided with function holes, drilling and tapping to be done in field. Comply with applicable requirements of ANSI A115 for door and frame preparation for hardware.
 - 5. Locate finish hardware as shown on final shop drawings.
 - 6. Removable mullions for double doors specified in Section 08700. Reinforce head sections where mullions occur.
- C. Attach fire rated metal label to each rated frame and door unit where visible when doors are in open position.
 - 1. Provide labeled frames with integral or applied smoke gaskets in accordance with UBC. Coordinate with Section 08700.
 - 2. Refer to Drawings for class requirements.
 - 3. Where oversize metal doors and frames are required, provide certification and information required by applicable authorities for approval.
- D. Close top edge of exterior door flush with inverted steel channel closure. Seal joints watertight. Close bottom edge of exterior door with steel channel closure.
- E. Anchor metal filler panels in place and seal with continuous beads of sealant specified in Section 07900, by "interior dry method", specified in Section 08800, to provide waterproof and weathertight installation.
- F. Doors beveled 1/8 in. in 2 in. at lock edge only.

2.07 FINISH

- A. Exterior Units: Galvanized, ASTM A525, G60 coating designation. Galvanize after fabrication and hardware preparation. Shop prime.
- B. Interior Units: Shop prime.
 - 1. Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces and back side of frames, with one coat factory applied baked on rust inhibitive primer paint. Touch up areas where factory coating has been removed due to sanding, welding, or handling.

- 2. Fill surface depressions with metallic paste filler and grind to smooth uniform finish, ready to receive gloss finish.
- C. Primer: Baked on, compatible with finish coat.
- D. Field painting specified under Section 099000.

PART 3 EXECUTION

- 3.01 INSPECTION
 - A. Installer must examine substrate and conditions under which steel doors and frames are to be installed and must notify Contractor in writing of any conditions detrimental to proper and timely completion of work.
 - B. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

3.02 INSTALLATION

- A. General: Install steel doors, frames and accessories in accordance with final shop drawings and manufacturer's data, and as herein specified.
 - 1. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instruction for Steel Frames," and as otherwise indicated.
 - 2. Install rated doors and frames in accordance with NFPA 80.
- B. Install frames in accordance with Drawings, SDI-100, SDI-105, SDI-111, and manufacturer's accepted shop drawings.
- C. Install non-rated doors in accordance with DHI.
- D. Coordinate with all construction for anchor placement.
- E. Coordinate installation of glass and glazing.
- F. Install stiffening roll formed steel reinforcement channels between two abutting frames. Anchor to structure above and to floor.
 - 1. Install steel splice plate reinforcement between abutting frames as required for field splicing.
 - 2. Secure a metal clip angle at bottom of each jamb and permanent mullion member of anchoring to floor, with a minimum of 2 fasteners.
- G. Frames in drywall: Seal frames at sound walls. Provide base anchors for all frames with openings more than 3'-0" wide, plus one compression anchor per jamb for "slip-on" type frames, three anchors per jamb for welded frames, and mullion section base and head anchors. Provide anchors at jambs of borrow lites and sidelites as above, plus two sill anchors. Attach base anchor to floor with power tool.
- H. Frames in CMU: To extent practicable, install concurrently with installation of CMU, with minimum three T-strap, adjustable or wire masonry anchors per jamb. Masonry anchors shall be required for rated frame installation, and a minimum of 7 ga. mild temper steel for wire

anchors. In masonry construction, locate three wall anchors per jamb at approximately hinge and strike levels. Building-in of anchors and grouting of frames is specified in Section 04230.

- I. Frames in In-Place CMU:
 - 1. Anchor frame jambs and head with minimum 3/8 in. concealed bolts into expansion shields or inserts as required for rated frame installation. Provide at jamb at 6 in. from top and bottom and at 26 in. o.c. between, unless otherwise shown. Provide relite jamb anchors as specified above, plus two head and three sill anchors.
 - 2. Fill head and jambs completely with grout. Fill all anchor dimples with appropriate filler and grind smooth prior to painting. Grind smooth finish cap over grout filling holes prior to painting. If frame is grout-filled prior to installation, provide continuous sealant between masonry and frame. Coordinate with Section 042000.
- J. Frames in exterior walls shall be completely filled with polyurethane foam insulation per Section 072140. Sealant per Section 079000.
 - 1. Install exterior and interior vestibule frames with base anchors plus three anchors per jamb, mullion section base and head anchors.

3.03 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 in. measured with straight edge, corner to corner.
 - 1. Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.
 - 2. Place fire-rated doors with clearances specified in NFPA 80.

3.04 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth and balanced door movement.
- B. Sound Doors:
 - 1. After finish hardware is installed, adjust operating parts for smooth operation and continuous contact between seals and adjoining surfaces.
 - 2. Assure no gaps occur between head, jamb and threshold seals. Visually inspect sound door assemblies in closed position for light leaks to identify potential acoustic leaks. Adjust to achieve light seal.
 - 3. Adjust threshold seal to be in full contact with floor or threshold, as appropriate.
- C. Prime Coat Touch Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- D. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION

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SECTION 08 20 00

WOOD DOORS

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:

Location of each type of wood door is indicated in the Drawings and schedules. The types of doors include but are not necessarily limited to solid core flush wood doors with hardwood veneer faces, with and without lites as indicated in the Drawings.

- 1. Shop priming of wood doors is included in this section.
- 2. Factory preparation for hardware (pre-matching) is included in this section at the Contractor's option.

Section 062000

B. Related Work Described Elsewhere:

1.	Hollow Metal Doors and Frames	Section 081110
2.	Door Hardware	Section 087000

3. Finish Carpentry

1.02 QUALITY ASSURANCE

A. Supervision:

Employ at least one supervisor, thoroughly familiar with the products and methods required for this work, who shall be present at all times during the operations of, and who shall direct, the work of this section.

B. Referenced Standards:

In addition to complying with all pertinent codes and regulations comply with:

1. NWMA Quality Marking:

Mark each wood door with NWMA Wood Flush Door Certification Hallmark certifying compliance with applicable requirements of ANSI/NWMA I.S. 1 Series. For manufacturers not participating in NWMA Hallmark Program, a certification of compliance may be substituted for marking of individual doors.

2. Manufacturer:

Obtain doors from a single manufacturer to ensure uniformity in quality of appearance and construction.

- C. References:
 - 1. ANSI/NWMA I.S. 1:

"Industry Standard for Wood Flush Doors" published by National Woodwork Manufacturers Association (NWMA).

2.

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AWI Quality Standard:

Section 13000 of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI). Designations for grade and core construction under types of doors refer to this standard.

1.03 SUBMITTALS

A. Product Data:

Submit door manufacturer's product data, specifications and installation instructions for each type of wood door.

- 1. Include details of core and edge construction, trim for openings and similar components.
- 2. Include certifications as may be required to show compliance with specifications.
- B. Shop Drawings:

Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, and other pertinent data.

C. Specific Product Warranty:

Submit written agreement signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors which have warped (bow, cup or twist) or which show telegraphing of core construction below in face veneers.

The warranty shall also include refinishing and reinstallation which may be required due to repair or replacement of defective doors.

Warranty shall be in effect during following period of time after date of substantial completion.

Solid Core Flush Interior Doors:

Life of installation.

1.04 PRODUCT HANDLING

A. Storage and Protection:

Do not deliver any of the products of this section to the jobsite until sheltered dry facilities, away from traffic, are available in which a temperature of 60^oF is maintained. Store doors upright off the floor with appropriate dunnage to prevent warpage due to stresses. Doors shall be individually wrapped at the factory. Maintain factory packaging until necessary to remove for installation. Use all means necessary to protect all materials at all times and to protect the installed work and material of all other trades. Comply with "on site" care recommendations of NWMA pamphlet "Care & Finishing of Wood Doors" and with manufactures instructions, and as otherwise indicated.

B. Replacements:

In the event of damage make all replacements necessary. Minor damage may be repaired upon authorization of the Architect and replacements shall be subject to his approval. Repairs and replacements shall be accomplished at no additional expense to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

Provide wood doors complying with applicable requirements of referenced standards for kinds and types of doors indicated and as specified.

- 1. Face Panels: Manufacturer's standard 2-ply face panels, unless otherwise indicated.
- 2. Exposed Surfaces: Provide kind shown or scheduled and as further specified. Provide same exposed surface material on both faces of each door. Provide stile edges same species as face.
- B. Fabrication Requirements:
 - 1. Openings:

Cut and trim openings through doors and panels as shown. Comply with applicable requirements of referenced standards for kind(s) of doors required.

Light Openings: Factory cut openings. Trim openings with metal fire-rated frames.

2. Interior Flush Wood Doors:

Solid Core Doors for Transparent Finish:

Faces and Edge: Plain Sliced Maple Book Match Veneer Grade: Premium SLC5 Core Construction: PC (Particleboard core) All Edges Bonded to Core.

3. Doors shall be factory fitted and factory machined for hardware. Coordinate with Section 087000.

2.02 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Marshfield DoorSystems, Inc. flush wood doors or a comparable product by one of the following:
 - 1. Marshfield Door Systems.
 - 2. Eggers Industries.
 - 3. Algoma Hardwoods, Inc.
- B. Manufacturer: The design is based on Marshfield Signature Series doors. Comparable products by other manufacturers will be considered upon submittal according to provision in Section 013400.

2.03 FACTORY FINISH

A. Before delivery of doors Finish exposed wood portions with AWI Transparent System TR-6 Acrylic Urethane. Provide stain as selected by the Architect.

2.04 PROTECTION

A. Doors are to be individually wrapped after finishing for shipment to the jobsite. Care shall be taken to properly protect doors. Damaged doors shall be rejected.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection: Prior to installation of the wood doors, carefully examine the frames into which they are to be fitted and verify that all previous work is complete to the point that hanging of the wood doors may properly proceed. Verify that doors may be installed in strict accordance with the original design, the approved shop drawings and all applicable codes and regulations.
- B. Discrepancies: Promptly notify Architect of discrepancies and do not proceed until fully resolved.

3.02 INSTALLATION

- A. Condition doors to average prevailing humidity in installation area prior to hanging.
- B. Hardware: For installation see Division-8 "Builders Hardware" section of these specifications.
- C. Manufacturer's Instructions: Install wood doors in accordance with manufacturer's instructions and as shown.
- D. Job Fit Doors: Align doors to frame for proper fit and uniform clearance at each edge and machine for hardware. Seal cut surfaces after fitting and machining.

Bevel non-rated doors 1/8" in 2" at lock and hinge edges.

- E. Clearance: For non-rated doors provide clearances of 1/8" at jambs and heads; 1/8" at meeting stiles for pairs of doors; and 1/2" from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold. Coordinate clearance with flooring transitions. Door bottoms shall not be trimmed at job site.
- F. Job Site Finished Doors: See painting sections in Division 9 of these specifications for requirements for finishing wood doors.

3.03 ADJUST AND CLEAN

- A. Operation: Rehang or replace doors which do not swing or operate freely, as directed by Architect.
- B. Protection and Completed Work: Advise Contractor of proper procedures required for protection of installed wood doors from damage or deterioration until acceptance of work.

END OF SECTION

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PAGE 1 OF 2

SECTION 08 30 50

ACCESS DOORS

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Non-rated access doors and frames. Provide access doors shown on Drawings.

Section 042000

Section 092500

Section 099000

- 2. Products installed by not Furnished under this Section: Install Cylinders furnished under Section 087000.
- B. Related Work Described Elsewhere:
 - 1. Concrete Unit Masonry
 - 2. Gypsum Wallboard
 - 3. Painting:

1.02 SUBMITTALS

- A. Submit product data under provision of Section 013400.
- B. Include sizes, types, finishes, scheduled locations, and details of adjoining work.
- C. Submit manufacturer's installation instructions under provisions of Section 013400.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. In Walls:

1.	Milcor	Product:	Style MS
2.	Karp Associates, Inc.	Product:	Model DSC-214M
3.	JL Ind.	Product:	Model TMS
4.	William Brothers Corp.		

2.02 ACCESS UNITS

A. Provide 2- 30" x 30", 2- 20" x 30" and 2– 16" x 30" painted access doors at locations shown, for radiant heater manifolds, with all necessary accessories for complete installation.

2.03 FABRICATION

- A. Fabricate frames and flanges of access doors for walls of 16 ga. stainless steel and door panels of 14 ga. stainless steel.
- B. Hardware:
 - 1. 165 degree concealed spring hinges or continuous stainless steel piano hinge.
 - 2. Cylinder lock materkeyed to rest of building.
 - 3. Cylinder furnished under Section 087000.

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2.04 FINISH

A. Walls: Manufacturer's standard primed for IPS 10 paint.

PART 3 EXECUTION

- 3.01 INSPECTION
 - A. Verify rough openings for door and frame are correctly sized and located.
 - B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install frames, plumb and level in wall openings.
- B. Position to provide convenient access to concealed work requiring access.
- C. Secure rigidly in place in accordance with manufacturer's instructions.

END OF SECTION

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SECTION 08 36 00

SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included:

Provide complete operating door assemblies including guides, counterbalance mechanisms, hardware, operators and installation accessories, as shown on the drawings and herein specified.

The types of doors and assemblies include but are not necessarily limited to the following:

- 1. Sectional upward acting doors, accessories and components.
- B. Related Work Described Elsewhere:

1.	Rough carpentry:	Section 061000
2.	Door hardware:	Section 087000
3.	Painting:	Section 099000

1.02 REFERENCE STANDARDS

- A. ASTM A –216 Specifications for sectional overhead type doors.
- B. ASTM A-229 Steel wire, oil tempered for mechanical springs.
- C. ASTM A- 526 Steel sheet, zinc-coated galvanized (hot-dip process), commercial quality.
- D. ASTM E-283 Test method for air leakage through exterior windows, walls and doors.
- E. ASTM E-330 Structural performance of exterior windows, curtain walls and doors by uniform static air pressure difference.

1.03 QUALITY ASSURANCE

Furnish the overhead door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

A. Supervision:

Employ at least one supervisor, thoroughly familiar with the products and methods required for this work, who shall be present at all times during the operations of, and who shall direct, the work of this section.

B. Qualifications of Installers:

1. For the actual installation of the overhead door, employ only qualified journeymen mechanics who are thoroughly trained and experienced in the skills required, and who are completely familiar with the manufacturer's recommended practices, as well as the requirements of this Work.

2. In the acceptance or rejection of work under this section, no allowance will be made for lack of skill on the part of Installers.

1.04 SUBMITTALS

After award of the contract, and before the overhead door for this project has been procured, submit for review by the Owner's Representative, in accordance with Section 013400, the following product data:

A. Manufacturer's Data:

Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of overhead door. Include operating instructions and maintenance information.

B. Shop Drawings:

Submit shop drawings for the fabrication and installation of door, frame, and associated components of the work. Include wall elevations, unit elevations, and half-size section details of every typical member.

1.05 PRODUCT HANDLING

A. Storage and Protection:

Do not deliver any of the products of this section to the jobsite until sheltered dry facilities, away from traffic, are available in which a temperature of 60°F is maintained. Store doors and grille off the floor, with appropriate dunnage to prevent warpage due to stresses. Maintain factory packaging until necessary to remove for installation. Use all means necessary to protect all materials at all times and to protect the installed work and material of all other trades.

B. Replacements:

In the event of damage make all replacements necessary. Minor damage may be repaired upon authorization of the architect and replacements shall be subject to his approval. Repairs and replacements shall be accomplished at no additional expense to the Owner.

PART 2 PRODUCTS

2.01 DESIGN

Design is based upon the specified products of the Wayne Dalton Corp. Model: Thermospan 200-20. Operators shall be Lift Master T75LL, or approved equal. Drawings reflect the desired location, configuration, and suggested installation details of the named manufacturer. All components of doors shall be hot-dipped galvanized.

Comparable products will be considered upon submittal in accordance with Section 013400.

2.02 MATERIALS

A. DOOR SECTIONS will be of steel/polyurethane/steel sandwich type construction with calculated R-Value of 17.4 (U value of 0.058), in accordance with ASHRAE methods. The exterior skin of structural qualify, hot-dipped-G60 galvanized, 20-gauge smooth flush steel will be finished with baked-on polyester primer and white polyester finish coats. The interior skin will have two 1- ³/₄" roll-formed integral struts per section. Interior and exterior skins will be separated by a factory extruded thermal break and the cavity will be completely filled with CFC-11 free foamed in place polyurethane insulation. Ends of sections will be capped with 16

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gauge hot dipped galvanized steel for double end hinges and fixtures. Door will be certified and labeled for compliance to IBC fire code ratings, in accordance with ASTM E-84 and ASTM D-1929 standards.

- B. TRACK and angles will be roll-formed of ASTM A-526 commercial quality steel coated with hotdipped galvanizing. Track will be 3" standard lift type, minimum 12 gauge per manufacturer's specifications. Vertical track will be graduated and fully adjustable to seal door to jambs. Horizontal tracks will be reinforced with continuous steel angle to resist deflection.
- C. HARDWARE hinges and brackets shall be made from ASTM A 526 commercial quality steel, coated with hot-dipped galvanizing. 3" rollers shall be 10-ball bearing with case hardened inner and outer races. Double end hinges and fixtures shall be provided.
- D. COUNTERBALANCE Springs shall be made of ASTM A –229 class II oil tempered mechanical spring wire, designed to provide minimum 50,000 cycles of use. Spring fittings and cable drums will be high strength aluminum mounted on solid steel shaft. Door pick-up cables shall be galvanized steel aircraft-type with minimum 5 to 1 safety factor.
- E. WEATHERSTRIPPING Doors shall be equipped with factory installed tube joint seals between sections. Brush type head and jamb seal shall be provided at top of door and jambs. Bulb-shaped astragal in PVC retainer at bottom of door shall be rated to remain flexible at -70 degrees F.
- F. WINDLOAD Doors shall meet or exceed 25 PSF windload rating, in accordance with ASTM E-330-70.
- G. GLAZING Provide full vision sections as indicated on the exterior elevations. Window sections to be aluminum stile and rail painted to match door exterior. Glass type will be clear tempered ½" insulated sealed units.
- H. OPERATION –Overhead doors shall be equipped with trolley type electric openers, ¾" HP, 115 Volt, Single Phase. Motor to be continuous duty industrial 60 Hz, removable without affecting limits. Operator shall be equipped with fused control circuit protection and full overhead protections. Output shafts shall be yellow chromate coated and equipped with sealed ball bearings. Provide adjustable friction clutch and solenoid brake. Door operating speed to be 12" per second. Trolley rails to be dual angle galvanized steel.
- I. CONTROLS Provide interior 3 button station and one auxiliary interior 3 button station for each door. Operator to be equipped with long distance wiring contactor. Provide (3)- 313 MHZ radio controls for each door. Transmitters to be 3-button open/close/stop capable of selecting and operating each door independently. Equip bottom of door with electric reversing safety edge and take-up reel.
- J. Paint over factory finish per Section 099000.

PART 3 EXECUTION

- 3.01 SURFACE CONDITIONS
 - A. Inspection: Prior to installation of overhead door, carefully examine the frame into which it is to be fitted and verify that all previous work is complete to the point that hanging of the door may properly proceed. Verify that door may be installed in strict accordance with the original design, the approved shop drawings and all applicable codes and regulations.

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- B. Promptly notify Architect of discrepancies and do not proceed until fully resolved.
- C. Door installer shall be responsible for all electrical costs beyond the Contractor provided power circuit "J" box.
- D. Installer shall be responsible for coordination and installation of low voltage wiring.

3.02 INSTALLATION

Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer's instructions, and as specified herein.

Upon completion of installation including work by other trades, lubricate, test and adjust doors and grilles to operate easily, free from warp, twist of distortion and fitting weathertight for entire perimeter.

END OF SECTION

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SECTION 08 41 00

ENTRANCES & STOREFRONTS

PART 1 GENERAL

1.01 DESCRIPTION

Α. Work Included:

> Entrances and windowwall are indicated in the Drawings and include but are not necessarily limited to Entrance doors, glazing support members, and metal framed windows.

> Furnish all necessary materials, labor and equipment for the complete installation of 1. aluminum framing as shown on the drawings and specified herein.

Related Work Described Elsewhere: Β.

1.	Gypsum Wallboard:	Section 092500
2.	Glazing:	Section 088000
3.	Joint Sealants:	Section 079000
4.	Door Hardware	Section 087000

1.02 QUALITY ASSURANCE

Α. Supervision:

> Employ at least one supervisor; thoroughly familiar with the products and methods required for this Work, who shall be present at all times during the operations of, and who shall direct, the work of this section.

Β. Qualification of Installers:

> For actual installation of special doors, employ only personnel who are thoroughly trained and experienced in the skills required, and who are completely familiar with the requirements of this Work.

C. Performance:

> Air infiltration shall be tested in accordance with ASTM E 283. Infiltration shall not exceed .06 CFM per square foot (.0003 $m^3/s-m^2$) of fixed area.

1. Water infiltration shall be tested in accordance with ASTM E 331. No water penetration at a test pressure of 6.24 P.S.F. (300 Pa).

Structural performance shall be based on:

Maximum deflection of 1/175 of the span, and allowable stress with a safety factor of 1.65.

The system shall perform to these criteria under a windload of 25 PSF.

1.03 SUBMITTALS

After award of the contract, and before any of the entrance or storefront for this project has been procured, submit for review by the Owner's Representative, in accordance with Section 013400, the following product data:

A. Manufacturer's Data:

Manufacturer's specifications standard details and recommendations for each type of window and door unit required. Include information on fabrication methods, finish hardware, glazing, and accessories.

B. Submit shop drawings for the fabrication and installation of fixed and operative aluminum windows and door units and associated components of the work. Include wall elevations, unit elevations, and half-size section details of every typical composite members, including glazing.

1.04 PRODUCT HANDLING

A. Storage and Protection:

Do not deliver any of the products of this section to the jobsite until sheltered dry facilities, away from traffic, are available for their storage. Store doors upright off the floor with appropriate dunnage to prevent warpage due to stresses. Maintain factory packaging until necessary to remove for installation. Use all means necessary to protect all materials at all times and to protect installed work and material for all other trades.

B. Replacements:

In the event of damage make all replacements necessary. Minor damage may be repaired upon authorization of the Owner's Representative and repairs or replacements shall be subject to his additional expense to the Owner.

PART 2 PRODUCTS

2.01 DESIGN

Design is based upon the TRIFAB II 451 framing systems and "350 TUFFLINE with 6" Cross Rail" doors, natural anodized aluminum as manufactured by the Kawneer Company. The specified product and the Drawings reflect the desired configurations and the manufacturer's recommended installation methods.

Comparable products will be considered upon submittal in accordance with Section 013400.

- A. Aluminum Extrusions:
 - 1. Extrusions shall be 6063-T5 alloy. Fasteners, where exposed, shall be aluminum, stainless steel or zinc plated steel in accordance with ASTM A 164-71. Perimeter anchors shall be aluminum or steel, providing the steel is properly insulated from the aluminum.
 - 2. Mullion configurations shall allow for pockets at the inside glazing face to receive fixed resilient elastomeric glazing spline. Where indicated mullions and horizontals shall have flexible (PVC) thermal break material located on exterior side of glass

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pane. Exterior glazing seal shall be synthetic polymer tape applied to main grid members. Provisions shall be made at all sealed horizontals to lead moisture accumulation to exterior.

- B. Finish:
 - 1. All exposed framing surfaces shall be free of scratches and other serious blemishes. Aluminum molding shall be given a caustic etch followed by an anodic oxide treatment to obtain a natural anodized aluminum anodic coating conforming to Aluminum Association Standard AA-MI2 C22 A31.
- C. Fabrication:

TRIFAB II 451:

1. The framing system shall provide for flush glazing on all sides with no projecting stops. Vertical and horizontal framing members shall have a nominal face dimension of 2". Overall depth shall be 4 1/2". Entrance framing members shall be compatible with glass framing in appearance. All single acting entrance frames shall include the Sealair positive barrier weathering.

350 TUFFLINE:

- 1. Doors and door frames shall be fabricated complete by the entrance manufacturer including the application of, or the preparation for, all operating hardware.
- 2. Door stiles and rails shall be 2" in depth, and the sections shall have a minimum wall thickness of 3/16" in sidewalls enclosing the basic tube.
- 3. The door stiles and rail face dimensions shall be:
 - a. Vertical Stiles: 3 1/2"
 - b. Top Rail: 3 3/8"
 - c. Bottom Rail: 10"
- 4. Frame moldings 4 1/2" in depth, which provide structural support for the door(s), shall be full tubular sections with minimum wall thickness of 3/16" at exposed faces and sides, 5/16" at recessed sidewalls receiving mortised or concealed hardware.
- 5. Weatherstripped aluminum moldings, fitted to each door and frame, shall form continuous interlocks between the hinge and lock jambs and the closed door. Each door opening shall be weather-stripped at jambs, head and threshold. Glazing moldings and trim inserts shall not be less than 1/16" thick.
- 6. Tuffline Doors are to be in Tuffline Framing with the Continuous Hinges, CPN Pulls, and Door Bottom Sweeps by the aluminum supplier installer. Cross rail on the Tuffline Doors shall be at 39" C/L to accommodate the Panic Devices.
- 7. Corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and fillet welds. Glazing stops shall be snap-in type with EPDM glazing gaskets.
- 8. Transom bar shall be joined to the jambs using a heavy walled jointer, clip and four #12 thread forming screws, two of which are threaded into 5/16" thick walls of the jamb. Four #10 thread forming screws per clip complete the fastening. Threshold clip to be heavy wall 5/23" thick steel and cover 3/4 of the depth of the jamb for

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extended stability. It is to be secured with two 1/4-20 and four #12-24 machines screws per joint.

- 9. Frame members which function primarily as glass holding assemblies shall be anchored with standard frame clips and machine screws. Glazing framing members and doors shall provide for fully resilient glass settings.
- 10. Mortised hardware shall be fitted flush with finished trim moldings and applied directly to recessed sidewalls of the door and/or frame tubing. Cut-outs in door or frame moldings shall not require separate screw-applied tabs of straps on which to mount hinging hardware. Where shims and spacers are required for finished appearance, they shall provide full and solid bearing for the hardware.
- D. Weather-stripping:
 - 1. Provide manufacturer's standard nonferrous spring metal, or vinyl gasket, designed for permanently resilient sealing under bumper or wiper action completely concealed when closed. Provide manufacturers standard door sweeps.

2.02 FRAMING AND DOOR SYSTEMS

- A. Single Glazed Entrances:
 - 1. Framing and doors shall be based upon the "TRIFAB II 451" system in natural anodized aluminum as manufactured by the Kawneer Company. Vertical and horizontal framing members shall have a nominal dimension of 2" x 4-1/2" and shall be flush glazed.
- B. Double Glazed Entrances:
 - 1. Framing and doors shall be based upon the "TRIFAB II 451T" system in natural anodized aluminum as manufactured by the Kawneer Company. Vertical and horizontal framing members shall have a nominal dimension of 2" x 4 1/2" and shall be flush glazed.
- C. Aluminum Doors:
 - 1. Aluminum doors shall be Kawneer 350 TUFFLINE with 10" high bottom rail in natural anodized aluminum. Include schlage cylinder locks keyed into master system.
- D. All windows and storefronts shall receive head receptor/compensation channels.
- E. Hardware: See Door Hardware 087000
 - 1. Provide CPN pull typical.
 - 2. Continuous Kawneer Hinges.
 - 3. Kawneer door bottom.
 - 4. Kawneer threshold.
 - 5. Kawneer flush bolts.

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2.03 MATERIALS

A. Other materials not specifically described but required for a complete and proper installation of entrance and window systems, shall be new first quality of their respective kinds, as selected by the Contractor and subject to the approval of the Owner's Representative.

PART 3 EXECUTION

3.01 FABRICATION

- A. General: Verify control measurements at jobsite prior to fabrication. Shop fabricate all components.
- B. Workmanship:
 - 1. Fabricate in strict accordance with the original Design and the approved submittals.
 - 2. Accurately miter and fit all members to hairline joints.
 - 3. Mechanically fasten aluminum frames along entire line of contact on the unexposed side.
 - 4. Discoloration on the face after anodizing will not be acceptable.

3.02 INSTALLATION

- A. Surface Conditions:
 - 1. Determine that all prior work is complete and surfaces are acceptable for subsequent operations. Promptly notify Owner's Representative of discrepancies and do not proceed until fully resolved.
- B. Replacements:
 - 1. Make all replacements necessary to ensure that only new, undamaged components are incorporated into the work. Field repairs will be acceptable only where replacement of components is involved. Field repair of individual components will not be acceptable. Replacements and repairs shall be subject to Owner's Representative's approval and shall be accomplished at no additional expense to the Owner.
- C. Setting:
 - 1. Set all members with adequate provision for settling expansion, or contraction without distortion of components or breaking of glass. Set all frames in sealant.
- D. Anchoring:
 - 1. Firmly anchor members using all devices required to ensure attachment of members for long life under hard use.
- E. Protection:
 - 1. Where aluminum is in contact with concrete, steel or other dissimilar metal, or other

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material conducive to electrolytic action, provide physical isolation or cathodic protection of all components. Protect all finished surfaces as necessary to prevent damage during progress of the work.

3.03 CLEANING

A. Immediately prior to turning work over to Owner, remove all protective materials from the framing members and other components and clean with materials recommended by manufacturer of the system components. Do not use abrasives.

END OF SECTION

SECTION 08 70 00

DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes hardware for wood & steel doors.
 - 1. Provide door gaskets, including weatherstripping and seals, and thresholds.

B. Related Sections:

- 1. Section 08 11 10 Hollow Metal Doors and Frames
- 2. Section 08 20 00 Wood Doors
- 3. Section 08 41 00 Entrance and Storefronts

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A156.1 Butts and Hinges.
 - 2. ANSI A156.3 Exit Devices.
 - 3. ANSI A156.4 Door Controls Closures.
 - 4. ANSI A156.5 Auxiliary Locks and Associated Products.
 - 5. ANSI A156.6 Architectural Door Trim.
 - 6. ANSI A156.7 Template Hinge Dimensions.
 - 7. ANSI A156.8 Door Controls Overhead Holders.
 - 8. ANSI A156.13 Mortise Locks and Latches.
 - 9. ANSI A156.16 Auxiliary Hardware.
 - 10. ANSI A156.18 Materials and Finishes
 - 11. ANSI A156 Complete Set of 24 BHMA Standards (A156 Series) with Binder.
- B. National Fire Protection Association:
 - 1. NFPA 80 Standard for Fire Doors, Fire Windows.
 - 2. NFPA 252 Standard Methods of Fire Tests of Door Assemblies.
- C. Underwriters Laboratories Inc.:
 - 1. UL 10C Fire Tests of Door Assemblies.
 - 2. UL 305 Panic Hardware.
 - 3. UL Building Materials Directory.
- D. Warnock Hersey:
 - 1. WH Certification Listings.

1.3 PERFORMANCE REQUIREMENTS

- A. Fire Rated Openings: Provide door hardware listed by UL or Warnock Hersey, or other testing laboratory approved by applicable authorities.
 - 1. Hardware: Tested in accordance with NFPA 252.

1.4 SUBMITTALS

- A. Section 013300 Submittal Procedures: Submittal procedures.
- B. Shop Drawings:

- 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements. Hardware submittal shall follow DHI (Door and Hardware Institute) vertical format and shall include hardware set number, door number, door size, door thickness, door type, location, handing, degree of opening and all submitted hardware listed with cut sheets attached in a separate document. Each door opening shall be listed separately.
- 2. Submit elevation and riser diagrams for each opening with electrical hardware. This information shall be sent with the hardware submittal to insure that electrical rough-in is properly completed on site.
- 3. Submit manufacturer's templates to all door and frame suppliers.
- C. Samples:
 - 1. If requested by Architect, submit one sample of typical hinge, latchset, lockset, and closer, illustrating style, color, and finish.
 - 2. Approved samples may be incorporated into Work. Samples will be returned to supplier.
- D. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

- A. Section 017000 Execution Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of installed cylinders and their master key code.
- C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with the following requirements:
 - 1. ANSI A156 series.
 - 2. NFPA 80.
 - 3. UL 305.
- B. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Hardware Supplier: Company specializing in supplying commercial institutional door hardware with minimum five years documented experience and factory direct with primary hardware manufacturers.
- C. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) qualified person to assist in work of this section.

- Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.
- 1.8 PRE-INSTALLATION MEETINGS
 - A. Section 013000 Administrative Requirements: Pre-installation meeting.
 - B. Convene minimum one week prior to commencing work of this section.
 - C. Include persons involved with installation of doors, frames, and hardware.
- 1.9 DELIVERY, STORAGE, AND HANDLING
 - A. Section 016000 Product Requirements: Product storage and handling requirements.
 - B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.10 COORDINATION

- A. Section 013000 Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
 - 1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.
- C. Sequence installation to accommodate required utility connections.
- D. Coordinate Owner's keying requirements during course of Work.

1.11 WARRANTY

- A. Section 017000 Execution Requirements: Product warranties and product bonds.
- B. Furnish a 10 year manufacturer warranty for locksets; 10 years for exit devices; 25 years for door closers.

1.12 MAINTENANCE MATERIALS

- A. Section 017000 Execution Requirements: Maintenance materials.
- B. Furnish special wrenches and tools applicable for each different and for each special hardware component.
- C. Furnish maintenance tools and accessories supplied by hardware component manufacturer.

1.13 EXTRA MATERIALS

A. Section 017000 - Execution Requirements: Spare parts and maintenance products.
B. Furnish ten extra key lock cylinders for each master keyed group.

PART 2 PRODUCTS

- 2.1 DOOR HARDWARE
 - A. Hinge Manufacturers:
 - 1. Ives 5BB1, 5BB1HW
 - 2. Stanley FBB179, FBB168, FBB191, FBB199.
 - 3. Bommer BB5000, BB5004, BB5006
 - 4. Substitutions: Section 016000
 - B. Power Transfer Manufacturers:
 - 1. Von Duprin EPT.
 - 2. Substitutions: Securitron CEPT.
 - C. Lockset, Latch Set, and Cylinder Manufacturers:
 - 1. Falcon Lock T series.
 - 2. Substitutions: Best, Sargent
 - D. Narrow Lock Body Manufacturers:
 - 1. Accurate Lock
 - 2. Substitutions: Section 016000
 - E. Exit Device Manufacturers:
 - 1. Falcon 24/25 series.
 - 2. Substitutions: Precision, Sargent
 - F. Magnetic Lock Manufacturers:
 - 1. Schlage Electronics M450 series.
 - 2. Substitutions: Securitron
 - G. Cylinder Manufacturers:
 - 1. Schlage
 - 2. Substitutions: Best, Kaba, Medeco
 - H. Closers Manufacturers:
 - 1. LCN 1450/4050 series.
 - 2. Substitutions: Norton
 - I. Door Controls and Overhead Holders Manufacturers:
 - 1. Glynn Johnson
 - 2. Rixson
 - 3. Substitutions: Section 016000
 - J. Push/Pull, Kick & Armor Plates Manufacturers:
 - 1. lves
 - 2. Trimco
 - 3. Tice Industries
 - 4. Substitutions: Section 016000
 - K. Gasketing, Weatherstrip, Thresholds, Door Sweep Manufacturers:
 - 1. Pemko

- 2. National Guard
- 3. Zero International
- 4. Substitutions: Section 016000
- L. Auto Sliding Door Operators:
 - 1. Tormax Model iMotion 2401
 - 2. Substitutions: Section 016000

2.2 COMPONENTS

- A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
 - 1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
 - 2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
 - 3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
 - a. Finish: Match hardware item being fastened.
 - 4. Fire Ratings: Provide hardware with UL or Warnock Hersey listings for type of application involved.
 - 5. Electrical Devices: Make provisions and coordinate requirements for electrical devices and connections for hardware.
- B. Hinges: ANSI A156.1, full mortise type, template type, ANSI A156.7, complying with following general requirements unless otherwise scheduled.
 - 1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
 - 2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
 - a. Fire Rated Doors to 86 inches High: Minimum three hinges.
 - b. Residential Hollow Core Interior Flat Panel Wood Doors: Furnish minimum two hinges.
 - 3. Size and Weight: 4-1/2 inch heavy weight typical for 1-3/4 inch doors.
 - a. Doors Over 40 inches Wide: Extra heavy weight ball or oilite bearing hinges.
 - b. Doors 1-3/8 inch Thick: 3-1/2 inch size.
 - c. Doors 2 inch Thick: 5 inch extra heavy weight ball or iolite bearing.
 - d. Doors Over 48 inches Wide: 5 inch extra heavy weight ball or oilite bearing.
 - 4. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior and locked outswinging doors, non-rising pins at interior doors.
 - 5. Tips: Flat button Ball Steeple tips with matching plug Flush tips Hospital tips.
- C. Locksets: Furnish locksets compatible with specified cylinders. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
 - 1. Mortise Locksets: ANSI A156.13, Series 1000, Grade 1 unless otherwise indicated.
 - 2. Auxiliary Locksets: ANSI A156.5, Grade 1, mortise dead locks bored dead locks rim locks narrow stile locks unless otherwise indicated.

- D. Latch Sets: Match locksets. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
 - 1. Mortise Latch Sets: ANSI A156.13, Series 1000, Grade 1 unless otherwise indicated.
- E. Exit Devices: ANSI A156.3, Grade 1 surface or concealed vertical rod, rim or mortise type, with push pad cross bar, unless otherwise indicated. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames, with dust-proof floor strikes.
 - 1. Types: Suitable for doors requiring exit devices.
 - 2. Exit devices shall have deadlatching feature.
- F. Cylinders: ANSI A156.5, Grade 1, 6 pin type interchangeable core cylinders.
 - 1. Keying: Key into a new Schlage Everest 29-S master key system.
 - 2. Keying: Keyed as directed by Owner. Keyed in like-groups. Keyed differently. Master keyed. Grand master keyed.
 - 3. Include construction keying.
 - 4. Keys: Nickel silver. Stamp keys with "DO NOT DUPLICATE".
 - 5. Supply keys in the following minimum quantities:
 - a. 10 master keys.
 - b. 5 grand master keys.
 - c. 10 construction keys.
 - d. 5 control keys and 10 extra cylinder cores.
 - e. 3 change keys for each cylinder core.
- G. Closers: ANSI A156.4 modern type with cover, surface mounted, full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
 - 1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking. Pressure relief valves are not permitted.
 - 2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees. Furnish extra duty arms wherever possible.
 - 3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
 - 4. Operating Pressure: Maximum operating pressure as follows.
 - a. Interior Doors: Maximum 5 pounds.
 - b. Exterior Doors: Maximum 8.5 pound.
 - c. Fire Rated Doors: As required for fire rating, maximum 15 pounds.
- H. Door Controls and Overhead Holders: Furnish with accessories as required for complete operational installation.
 - 1. Manual Door Holders and Overhead Stops: ANSI A156.8, Grade 1 types as specified
- I. Push/Pulls, Manual and Automatic Bolts, Protection Plates, Gaskets, Thresholds, and Trim: Furnish as indicated in Schedule, with accessories as required for complete operational door installations.
 - 1. Push/Pulls: ANSI A156.6; push plates minimum 0.050 inch thick. Furnish straight push-pull plate type pulls with bolts to secure from opposite door face; furnish with minimum 0.050 inch pull plates unless otherwise indicated.
 - 2. Kickplates, Armor Plates & Door Edging: ANSI A156.6, metal; height & width indicated in Schedule; minimum 0.050 inch thick stainless steel.

- 3. Weatherstripping: Furnish continuous weatherstripping at top and sides of exterior doors.
- 4. Fire Rated Gaskets: Furnish continuous fire rated gaskets at top and sides of fire rated doors.
- 5. Thresholds: Maximum 1/2 inch height. Provide a thermally broken assembly.
- 6. Wall Stops: ANSI A156.1, Grade 1, concave pad wall stop with no visible screws.
- 7. Floor Stops: ANSI A156.1 Grade 1 dome type standard floor type with no visible screws; furnish with accessories as required for applications indicated.

2.3 ACCESSORIES

- A. Lock Trim: Furnish levers with rose escutcheon plate as indicated in Schedule to match Owner's existing hardware.
 - 1. Through bolts are not permitted on solid wood core doors unless they are not visible after installation.
- B. Through Bolts: Do not permit through bolts and grommet nuts on door faces in occupied areas unless no alternative is possible.
 - 1. Do not use through bolts on solid wood core doors.

2.4 FINISHING

- A. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.
 - 1. Hinges:
 - a. BHMA 652, 630 and 626, satin finish. Use where indicated in Schedule.
 - 2. Typical Exterior Exposed and High Use Interior Door Hardware:
 - a. BHMA 630, satin finished stainless steel.
 - b. BHMA 626, satin chromium plated brass or bronze.
 - 3. Typical Interior Door Hardware:
 - a. BHMA 626, satin chromium plated brass or bronze.
 - b. BHMA 630, satin finished stainless steel.
 - 4. Typical Interior Toilet Room Bathroom Door Hardware:
 - a. BHMA 626, satin chromium plated brass or bronze.
 - b. BHMA 630, satin finished stainless steel.
 - 5. Closers: Finish appearance to match door hardware on same face of door.
 - a. BHMA 689, satin aluminum, powder coated.
 - Thresholds: Finish appearance to match door hardware on exterior face of door.
 a. BHMA 628, satin aluminum, clear anodized.
 - 7. Other Items: Furnish manufacturer's standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Section 013000 Administrative Requirements: Coordination and project conditions.
 - B. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings and as instructed by manufacturer.

C. Verify electric power is available to power operated devices and is of correct characteristics.

3.2 INSTALLATION

- A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.
- B. Do not use through-bolts on wood doors unless required by manufacturer fire testing. Doors shall be adequately reinforced to install door hardware without the use of throughbolts.
- C. Mounting Heights From Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and applicable codes where not otherwise indicated.
 - 1. Locksets: 38 inch.
 - 2. Push/Pulls: 42 inch.
 - 3. Push Pad Type Exit Devices: 40 inch.
 - 4. Top Hinge: Jamb manufacturer's standard, but not greater than 10 inches from head of frame to center line of hinge.
 - 5. Bottom Hinge: Jamb manufacturer's standard, but not greater than 12-1/2 inches from floor to center line of hinge.
 - 6. Intermediate Hinges: Equally spaced between top and bottom hinges and from each other.
 - 7. Hinge Mortise on Door Leaf: 1/4 inch. to 5/16 inch from stop side of door.

3.3 FIELD QUALITY CONTROL

- A. Section 014000 Quality Requirements: Testing and Inspection Services. 017000 Contract Close Out Procedures: Testing, adjusting, and balancing.
- B. Architectural Hardware Consultant Supplier Primary Hardware Manufacturer's Representatives inspect installation and certify hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUSTING

- A. Section 017000 Contract Close Out Procedures: Testing, adjusting, and balancing.
- B. Adjust hardware for smooth operation.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 017000 Contract Close Out Procedures: Protecting installed construction.
- B. Do not permit adjacent work to damage hardware or hardware finish.

3.6 SCHEDULES

A. The following hardware groups are intended to establish type and standard of quality when used together with this section's requirements. Examine Drawings and Specifications and furnish proper hardware for all door openings.

PART 4

HARDWARE GROUP NO. 01 - DOOR # 100

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	CONTINUOUS PER DOOR MFR.	630	KAW
1	EA	PANIC HARDWARE	24-R-C-718	626	FAL
1	EA	MORTISE CYLINDER	20-061 ICX	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	90 DEG OFFSET PULL	CPN PULL PER DOOR MFR	630	KAW
1	EA	CLOSER W/STOP ARM	4050 SCUSH	689	LCN
1	EA	PA MOUNTING PLATE	4050-18PA	689	LCN
1	EA	CUSH SHOE SUPPORT	4050-30	689	LCN
1	EA	BLADE STOP SPACER	4050-61	689	LCN
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	DOOR BOTTOM	PER DOOR MFR	AA	KAW
1	EA	THRESHOLD	PER DOOR MFR	А	KAW
1			SEALS/SILENCERS BY DOOR/FRAME		
			SUPPLIER		

HARDWARE GROUP NO. 02 - 101A, 101B

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	CONTINUOUS PER DOOR MFR.	630	KAW
1	EA	PANIC HARDWARE	24-R-C-718	626	FAL
1	EA	MORTISE CYLINDER	20-061 ICX	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	90 DEG OFFSET PULL	CPN PULL PER DOOR MFR	630-316	KAW
1	EA	CLOSER W/STOP ARM	4050 SCUSH	689	LCN
1	EA	PA MOUNTING PLATE	4050-18PA	689	LCN
1	EA	CUSH SHOE SUPPORT	4050-30	689	LCN
1			SEALS/SILENCERS BY DOOR/FRAME SUPPLIER		

HARDWARE GROUP NO. 03 - 102, 209, 210

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY W/INDICATOR	MA301L OCCUPIED/VACANT AGM	626	FAL
1	EA	MORTISE CYLINDER	20-061 ICX	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA (FOR SOUND)	BK	ZER

HARDWARE GROUP NO. 04 - 103, 107A, 108, 116, 203, 204

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	T581L6 BRW	626	FAL
1	EA	CYLINDER	24-031	626	SCH
1	EA	OH STOP	90S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 05 - 105

PRO\	/IDE E	ACH SGL DOOR(S) WITH	THE FOLLOWING:		
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	T581L6 BRW	626	FAL
1	EA	CYLINDER	24-031	626	SCH
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 06 - 104A, 107B, 109

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	T581L6 BRW	626	FAL
1	EA	CYLINDER	24-031	626	SCH
1	EA	SURFACE CLOSER	4050 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

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HARDWARE GROUP NO. 07 - 104B, 201

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	T581L6 BRW	626	FAL
1	EA	CYLINDER	24-031	626	SCH
1	EA	SURFACE CLOSER	4050 SCUSH W/ O.H. STOP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE GROUP NO. 08 - 104C, 111A, 111B, 111E, 112, 113, 301

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	LOCKSET -SIMPLEX	8146S 26DX REMOVABLE CONS. CORE	626	SIM
1	EA	CYLINDER	24-031	626	SCH
1	EA	CLOSER W/STOP ARM	4050 SCUSH W/ O.H. STOP	689	LCN
1	EA	CUSH SHOE SUPPORT	4050-30	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	8724A	А	ZER

HARDWARE GROUP NO. 09 - 110, 211

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	T581L6 BRW	626	FAL
1	EA	CYLINDER	24-031	626	SCH
1	EA	SURFACE CLOSER	1450 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

HARDWARE GROUP NO. 10 - 205, 206, 207

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	T581L6 BRW	626	FAL
1	EA	CYLINDER	24-031	626	SCH
1	EA	SURFACE CLOSER	SCUSH W/ O.H. STOP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

END OF SECTION

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SECTION 08 80 00

GLAZING

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Glass and glazing for hollow metal work.
 - B. Related Work Described Elsewhere:

1.	Finish Carpentry	Section 062000
2.	Joint Sealants	Section 079000
3.	Hollow Metal Doors and Frames	Section 081110
4.	Entrances and Storefronts	Section 084100

- C. References:
 - 1. American National Standards Institute (ANSI): ANSI Z97.1-1984 Glazing Material Used in Buildings, Performance Specifications and Methods of Test for Safety.
 - 2. American Society for Testing and Materials (ASTM):
 - a. E283-84 Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
 - b. E331-86 Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - c. E774-84a Sealed Insulating Glass Units.
 - 3. Federal Specifications (FS):
 - a. DD-G-451 Glass, Float or Plate, Sheet, Figured (Flat, for Glazing, Mirrors and Other Uses).
 - b. DD-G-1403 Glass, Plate (Float), Sheet, Figured and Spandrel (Heat Strengthened and Fully Tempered).
 - 4. Flat Glass Manufacturer's Association (FGMA): Glazing Manual and Glazing Sealing System Manual.
 - 5. Sealed Insulating Glass Manufacturers Association (SIGMA): 70-7-1 Recommended Practices for Vertical Field Glazing of Organically Sealed Insulated Glass Units.

1.02 QUALITY ASSURANCE

- A. Conform to FGMA Glazing Manual and Glazing Sealing Systems Manual for glazing installation methods.
- B. Certification:

Manufacturer of secondary sealant for insulating glass shall test glass and glazing materials and accessories for compatibility with secondary sealant; furnish test results and certification that materials furnished meet or exceed specified requirements and that use of products will not adversely affect performance of other products in combination.

C. Design Criteria:

Wind Load: Verify that glass thickness indicated shall resist minimum 30 psf uniform pressure acting inwardly or outwardly without exceeding deflection limits specified.

- 1. Normal-to-wall deflection: Maximum 1/200 of span.
- 2. Parallel-to-wall deflection: less than 75% of glass edge clearances.
- 3. Where required to meet the above limits, provide heat strengthened glass where float is scheduled. Do not increase glass thickness.

1.03 SUBMITTALS

- A. Submit manufacturer's specifications and installation instructions for each type of glazing sealant and compound gasket, and associated miscellaneous material required under provisions of Section 01340. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements, and is intended generally for the applications shown.
- B. Provide structural, physical and environmental characteristics, size limitation, special handling or installation requirements.
- C. Submit 12 x 12 in size, illustrating specified glass unit.
- D. Submit 12 in. long bead of glazing sealant in color selected.
- E. Submit sealed glass unit manufacture's certificate indicating units meet or exceed specified requirements.
- 1.04 DELIVERY, STORAGE AND HANDLING
 - A. Deliver to site and handle products under provisions of Section 016100.
 - B. Store and protect products under provisions of Section 016200.

1.05 WARRANTY

- A. Provide manufacturer's warranty under provisions of Section 017400.
- B. Warranty:
 - 1. Include coverage of sealed glass units from seal failure, interpane dusting, or misting, replacement of same for a period of ten years.
 - 2. Include coverage of laminated glass units from edge separation or material defects such as bubbling, discoloration, loss of physical and mechanical properties, and obstruction of vision through the glass surface, and replacement of same for a period of five years.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS
 - A. Primary Glass:
 - 1. PPG Industries, Inc.
 - 2. Cardinal Insulating Glass (CIG)

3. LOF

B. Substitutions: Refer to Section 016300.

2.02 GLASS MATERIALS

- A. Insulating Glass: Tempered glass: Clear ¼ inch thick glass as indicated, fully tempered as required by ANSI Z97.1. Tong-free with roll marks in horizontal plane. Perform required cutting, shaping, boring and grinding prior to tempering. ASTM E774, Class A. Two 1/4 in. thick glass lites with sealed dry air or gas filled space having -40° F. or lower dew point. Total 1 in. thick, with keyed corner galvanized steel spacers filled with desiccant.
 - 1. Insulating Glass Schedule:
 - a. Glass Type (GL1): Tempered Low-E Coated, Clear Insulating Glass
 - 1) Overall Unit Thickness: 1 inch
 - 2) Minimum Thickness of Each Glass Lite: ¹/₄ inch
 - 3) Outer Lite: Tempered ¼ inch heat strengthened, Low-E #2: PPG Solarban 60 with Low-E on second surface.
 - 4) Interspace Content: Argon
 - 5) Indoor Lite: Tempered ¹/₄ inch PPG Clear float glass
 - 6) Winter Nightime U-Factor: 0.29 maximum
 - 7) Light to Solar Gain: 1.79
 - 8) Visibile Light Transmittance: 0.70 percent
 - 9) Solar Heat Gain Coefficient: 0.39 maximum
 - 10) Safety glazing where requried
 - b. Glass Type (GL2): Low-E Coated, Clear Insulating Glass

1)Overall Unit Thickness: 1 inch

2)Minimum Thickness of Each Glass Lite: 1/4 inch

3)Outer Lite: ¼ inch heat strengthened, Low-E #2: PPG Solarban 60 with Low-E on second surface.

- 4)Interspace Content: Argon
- 5)Indoor Lite: 1/4 inch PPG Clear float glass

6)Winter Nightime U-Factor: 0.29 maximum

7)Light to Solar Gain: 1.79

8)Visibile Light Transmittance: 0.70 percent

9)Solar Heat Gain Coefficient: 0.39 maximum

- 10) Safety glazing where requried
- c. Glass Type (GL3): Clear Tempered Glass
 1)Overall Unit Thickness: ¼ inch
 2)Minimum Thickness of Each Glass Lite: ¼ inch
 3)Lite: Fully Tempered Float Glass
 4)Safety glazing where required
- d. Glass Type (GL4): Clear Glass
 - 1) Overall Unit Thickness: 1/4 inch
 - 2)Minimum Thickness of Each Glass Lite: 1/4 inch
 - 3)Lite: Float Glass
 - 4)Safety glazing where requried

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- B. Fire Protection Rated Glass: 20-90 minute fire-protection-saftey galazing. Nominal 5/16" thick laminated ceramic glazing, listed for use in doors, sidelites, transoms and bottowed lights.
 - 1. Fire-Protection Rated Glass Schedule:
 - a. Glass Type (GL5): Fire Protection Glass Clear

 Model: TGP Firelite Plus, or approved equal
 Overall Unit Thickness: 3/16 inch
 Visibile Light Transmittance: 88 percent
 Visibile Reflection: 9 percent
 Weight: 2.56 lbs/ft2
 Hardness (Vicker's Scale): 700
 Fire-Rating: 20-90minutes as required to meet specified rating
 Impact Safety Resistance: None
 Possitive Ressure Test: UL 10C
 Surface Finish: Premium Grade

2.03 GLAZING ACCESSORIES

- A. Glazing Sealant: As specified Section 079000.
- B. Provide glazing accessories, for use with insulating glass units, compatible with products of, and recommended by, manufacturer of secondary seal. Dow Corning Custom Extructions or acceptable substitute. Include setting blocks, space shims, glazing tape, and compressible filler rods.
- PART 3 EXECUTION
- 3.01 INSPECTION
 - A. Verify surfaces of glazing channels and recesses are clean, free of obstructions, and ready for work of this Section.
 - B. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Matching: Unify appearance of each series of lites by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in same direction as other pieces. Install tempered glass with roll marks in horizontal plane.
- 3.03 INSULATING GLASS
 - A. Install insulating glass units in accordance with requirements of SIGMA 70-7-1.

3.04 INTERIOR COMBINATION METHOD AT EXTERIOR STEEL DOORS AND FRAMES

A. Cut glazing tape to length; install against permanent stops, projecting 1/16 in. above sight.

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	B.	Place setting blocks at 1/4 points.			
	C.	Rest glass on setting blocks and push against fixed stop with sufficient pressure to attain full contact at perimeter of pane.			
	D.	Install removable stops without displacement of glazing spline. Exert pressure for full continuous contact.			
E. Fill gap between pane and stops with silicone type sealant to depth equal to bite of pane, but not more than 3/8 in. below sightline.					
	F.	Trim protruding tape edge.			
	G.	Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surfaces with solvent for smooth appearance.			
3.05	INTER	IOR DRY METHOD AT INTERIOR RELITES AND DOORS			
	A.	Cut glazing tape to length and set against permanent stops, projecting 1/16 in. above sightline.			
	В.	Place setting blocks at 1/4 points.			
	C.	Rest glass on setting blocks and push against tape for full contact at perimeter of pane.			
	D.	Place glazing tape on free perimeter of pane in same manner described above.			
	E.	Install removable stop without displacement of tape. Exert pressures on tape for full continuous contact.			
	F.	Knife trim protruding tape.			
3.06	GLAZI	NG METHOD AT ALUMINUM WINDOWS			
	A.	Specified under Section 084100.			
3.07	CLEAN	ling			
	A.	Clean glazing under provisions of Section 017100.			
	В.	After installation, mark pane with an "X" on interior of frame by using plastic tape or streamers. Do not apply markers directly to glass.			
	C.	Remove glazing materials from finish surfaces.			
	D.	Remove labels after work is completed.			
	E.	Wash and polish glass on exposed surfaces not more than four days prior to Substantial Completion, under provisions of Section 017100.			
	F.	Clean glass in accordance with manufacturer's recommendations. Do not use abrasive materials or broken razor blades for cleaning.			
		END OF SECTION			
		08 80 00 - 5			

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SECTION 09 12 00

CEILING SUSPENSION SYSTEM

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Suspended gypsum wallboard ceiling system framing.
 - B. Related Work Described Elsewhere:
 - 1. Cold Formed Metal Framing
 - 2. Gypsum Wallboard
 - 3. Accoustical Ceilings

Section 054000 Section 092500 Section 095110

Section 0

C. References:

- 1. American Society for Testing and Materials (ASTM):
 - a. A641-82 Zinc-Coated (Galvanized) Carbon Steel Wire
 - b. C645-83 Non-Loadbearing Steel Studs, Runners, and Rigid Furring Channels.
 - c. C754-82 Installation of Steel Framing Members to Receive Screw Attached Gypsum Wall board, Backing Board, or Water Resistant Backing Board.
- 2. Gypsum Association (GA): 219-78 Recommendations for Installation of Steel Door Frames in Steel Stud Gypsum Board Fire Rated Partitions.

1.02 QUALITY ASSURANCE

A. Perform the work in accordance with ASTM C754. Maintain one copy of document on site for Owner Representative's review.

1.03 SUBMITTALS

- A. Submit materials list and product data under provisions of Section 013400.
- B. Indicate and provide data on materials for framing, openings, bracing, blocking and reinforcement.

1.04 REGULATORY REQUIREMENTS

A. Comply with requirements of applicable codes for fire rated suspended ceiling framing.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fasteners:
 - 1. Gypsum Board to Furring: Refer to Section 092500.
 - 2. Hanger Wire to Concrete: Eye bolt with drilled-in expansion anchor sized for 432 lbs each, or 3 x calculated 12 lb. /sq.ft. total loads, whichever is the larger load. Similar and equal to Diamond Blue-Cut 06-00732 or 06-00532.

- B. Furring Members: Cold-rolled hat-shaped furring members, .3 lb./ft. minimum, galvanized, refer to Section 092500.
- C. Ceiling Suspension Main Runners:
 - 1. 1-1/2 inch steel channels, .0475 lb. per ft. cold-rolled.
 - 2. Hanger Wire: ASTM A641, soft, Class 1 galvanized, prestretched; 12 ga. minimum wire size.
 - 3. Optional Ceiling Suspension Framing: Similar and equal to Chicago Metallic Fire-Front 650 Furring System, UL Listed for use in construction indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install main carrying runner channels and furring to height indicated. Erect after above ceiling work is compete. Coordinate location of hangers with other work.
- B. Install main carrying runner channels and furring independent of walls, columns, and above ceiling work. Securely anchor hangers to structural members or concrete deck. Do not attach to plywood roof deck.
- C. Space hangers not over 4 ft. in direction of 1-1/2 inch main carrying runner channels and not over 3 ft. at right angles to main carrying runner channels, and within 6 in. of ends of main runner runs and of boundary walls, girders or similar interruptions of ceiling continuity.
- D. Place main carrying runner channels not over 3 ft. o.c., properly positioned, leveled and saddle tied to hanger wires. Locate main carrying runner channels within 6 in. of walls to support ends of cross furring. Lap splice securely.
- E. Securely fix main carrying runner channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- F. Provide two loops at hanger wire/eye bolt connection at top and two loops at hanger wire/main carrying runner channels at bottom.
- G. Place cross furring perpendicular to carrying channels, not more than 2 in. from perimeter walls, and rigidly secure. Lap splice securely. Space metal furring members 16 in. o.c. and saddle tie with two strands of 16 ga. tie wire to main runners. Provide end splices by nesting channels of studs no less than 8 in., securely wire tied.
- H. Reinforce openings in suspension system which interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 2 ft. past each opening.
- I. Laterally brace suspension system.

3.02 TOLERANCES

A. Install members to provide surface plane with maximum variation of 1/8 in. in 10 ft. in any direction.

END OF SECTION

GYPSUM WALLBOARD

PAGE 1 OF 6

PART 1 GENERAL

DESCRIPTION 1.01

- Α. Work Included:
 - 1. Gypsum Board.
 - 2. Furring and miscellaneous light gage metal shapes.
 - 3. Taped and sanded joint treatment.
 - Draftstops, where shown. 4.
 - Acoustical accessories. 5.
 - Metal Framing. 6.
- Β. Related Work Described Elsewhere:

1.	Batt and Blown-In Insulation	Section 072130
2.	Joint Sealants	Section 079000
3.	Hollow Metal Doors and Frames	Section 081110
4.	Ceiling Suspension System	Section 091200
5.	Tile Wall Finish	Section 093120
6.	Accoustical Ceilings	Section 095110

7. **Toilet and Bath Accessories**

093120 Section 095110 Section 108000

- C. References:
 - 1. American Society for Testing and Materials (ASTM) :
 - a. C36-84a Gypsum Wallboard.
 - b. C442-84a Gypsum Backing Board
 - c. C475-81 Joint Treatment Materials for Gypsum Wallboard Construction.
 - d. C665-84 Mineral Fiber Blanket Thermal Insulation for Light Frame Construction
 - e. C754-82 Installation of Steel Framing Members to Receive Screw-Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.
 - E84-84 Surface Burning Characteristics of Building Materials. f.
 - g. ANSI/ASTM C645 Non-Load Bearing Steel Studs, Runners, and Rigid Furring Channels for Screw Application of Gypsum Board.
 - 2. Gypsum Association (GA) :
 - a. GA 216 Recommended Specifications for Application and Finishing of Gypsum Board.
 - b. GA 203 Installation of Screw-Type Steel Framing Members to Receive Gypsum Board.
 - c. GA 219 Recommendations for Installation of Steel Door Frames in Steel Stud Gypsum Board Fire - Rated Partitions.

QUALITY ASSURANCE 1.02

- Perform gypsum board systems work in accordance with recommendations of GA 216 unless Α. otherwise specified in this Section.
- Β. Keep copy of GA 216 on site for duration of Project.

1.03 REGULATORY REQUIREMENTS

- A. Fire-Rated Partitions: Listed by UL.
- B. Fire-Rated Ceilings: Listed by UL.

1.04 SUBMITTALS

A. Submit manufacturer's product data and installation instructions under provisions of Section 0134000.

PART 2 PRODUCTS

- 2.01 FURRING ACCESSORIES
 - A. Provide materials in accordance with GA 216.
 - B. Furring Channels: Minimum 25 ga. roll-formed galvanized steel hat shaped channels, 7/8 in. deep.
 - C. Resilient Channels: Formed-steel; minimum 25 ga.; size and length required, flattened "Z" profile. Manufactured by US Gypsum.
 - D. Furring, Fasteners and Anchorage: ASTM C754.
 - 1. To masonry and concrete: Hammer-set or power-driven.
 - 2. To wood framing: Type W Bugle Screws, 1-1/4 in. long.
 - 3. To sheet metal studs: Type S Bugle Screws, 1-1/4 in. long.
 - 4. To steel shapes: Self-drilling fasteners similar and equal to Buildex "Tek" screws; size and type suitable for condition of use.

2.02 GYPSUM BOARD

- A. Provide gypsum board materials in accordance with recommendations of GA 216. All materials fire resistant.
- B. Fire Rated Gypsum Board: ASTM C-365 Type "X"; maximum permissible length.
 - 1. Thickness: 5/8 in. thick, except 1/2 in. thick where shown
 - 2. Width: 4'
 - 3. Length: 8'
 - 4. Weight: 2500 lbs
 - 5. Edges: Tapered
 - 6. Surfacing: Coated fiberglass mat on face, back
 - 7. Flexural strength, parallel, lbf: 100
 - 8. Flexural strength, perpendicular: 140
 - 9. R Value: 0.67
 - 10. Combustibility: Non-combustible
 - 11. Nail pull resistance, minimum, lbf: 90
 - 12. Hardness core, edges, and ends, lbf: >15
 - 13. Water absorption (% of weight): <5%
 - 14. Surface water absorption: <1.6 grams
 - 15. Surface burning characteristics (per ASTM E 84) flame spread//smoke developed: 0/0

- 16. Bending Radius: 8'
- C. Gypsum Backing Board: ASTM C442, Type "X"; 5/8 in. thick, except 1/2 in. thick where shown; maximum permissible length; ends square cut.
- D. High Density Gypsum Board: Georgia Pacific Dens Armor Plus Fireguard or Equal.
- E. Exterior Gypsum Wall Sheathing: Georgia Pacific DensGlass or Equal.

2.03 GYPSUM BOARD ACCESSORIES

- A. Provide gypsum board accessories in accordance with GA 201 and GA 216.
- B. Corner Beads: Metal. GA 201; ANSI-CB-114 x 114.
- C. Edge Trim: GA 201 and GA 216; "L" Bead; ANSI-LS-58.
- D. Reinforcing Tape, Joint Compound, Adhesive, Water, Fasteners: GA 216.
- E. Fasteners: GA 216:
 - 1. To metal furring: Type S, self-drilling, self tapping, 1-1/4 in. long at single layer; 1-5/8 in. long at double layer construction.
 - 2. To wood framing: Type W, 1-1/4 in. long.
 - 3. To joists at one-hour rated roof-ceiling construction: First Layer Type S Bugle screws, 1-5/8 in. long at 12 in. o.c. Second Layer - Type S Bugle screws, 2 in. long at 12 in. o.c. in field and 8 in. o.c. at butt edges, unless otherwise required to achieve assembly rating.
 - 4. To concrete or block walls: OSI Pro-Series Fourmula #38, per manufactures specifications.

2.04 ACOUSTICAL ACCESSORIES

- A. Acoustical Blankets:
 - 1. Meet or exceed requirements of ASTM C665 and ASTM E84, having flame spread of 10, and smoke development of 10.
 - 2. Provide acoustical wall treatment similar and equal to "Noise Barrier Batt Insulation" as manufactured by Owens Corning Fiberglass Corporation.
 - 3. Size blankets in accordance with application, full thickness of studs.
- B. Acoustical Sealant: Specified under Section 079000.

2.05 STUDS AND TRACKS

- A. Sheet steel channel or "C" shaped at least 1-1/4 inch knurled return flange suitable for nested or interlocked palled splicing and screw attachment of gypsum wallboard per ASTM C645.
- B. 3 5/8 inches through the wall thickness 14 feet maximum length typical unless noted otherwise in the Drawings.
- C. Metal thickness: Per Section 054000.
- D. Provide punched openings at 1-1/2 inches diameter, not more than twenty-four inches on center. Studs full, single piece for height required.
- E. Finish: Light commercial galvanized per ASTM A525.

F. Shaft Wall Studs and Tracks per stud manufacturer's instructions: Special shapes per Performance Requirements.

2.06 FASTENERS

- A. Self-drilling, self-tapping drywall and metal screws in accordance with ASTM C1002 and GA 216. Only GWB screws allowed in GWB, no nails.
 - 1. Length to penetrate GWB and Backing.
- B. Metal Studs to Runners, Furring Channels, and Other Metal Accessories: Self-drilling, selftapping pan head type "S" screws, size per metal stud manufacturer's written recommendations for specified fire resistance but not less than 3/8 inch long.

PART 3 EXECUTION

3.01 INSPECTION

- A. Review and coordinate sequencing of work to ensure that everything to be concealed by gypsum board has been accomplished, and that chases, access panels, openings, supplementary framing and blocking, vapor retarders and similar provisions have been completed.
- B. Beginning of installation means installer accepts condition of substrates.
- 3.02 WALL FURRING INSTALLATION
 - A. Erect wall furring vertically, directly attached to concrete block walls at 24 in. o.c. space fasteners not more than 24 in. o.c. staggered each flange.
 - B. Erect resilient channels horizontally at 24 in. o.c. fasten directly to metal framing, not more than 4 in. from abutting walls.

3.03 GYPSUM BOARD INSTALLATION

- A. Heat space to receive gypsum board as required to maintain a constant and uniform 55 degrees
 F. minimum for one week prior to start of installation. Maintain temperature until permanent heating system is in operations.
- B. Verify that partitions requiring thermal or sound installation are properly insulated prior to placing gypsum board.
- C. Install gypsum board per GA 216.
- D. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
- E. For double layer applications, use gypsum backing board for first layer, placed perpendicular to framing or furring members. Place second layer perpendicular to first layer. Ensure joints of second layer do not occur over joints of first layer.

- F. Apply all gypsum board at masonry in vertical panel direction and secure in place until all has cured per manufacture recommendation.
- G. For double layer applications, use second layer through first into framing with screws fasteners specified. Spacing of fasteners in accordance with GA 201, except space fasteners in accordance with UBC at fire rated assemblies.
- H. Place corner beads at external corners. Use longest practicable lengths. Place edge trim where gypsum board abutts dissimilar materials and at reveals.
- I. Wrap gypsum board behind recessed items in rated gypsum board partitions.

3.04 JOINT TREATMENT

- A. Maintain temperature at minimum 55 °F.
- B. Provide adequate and continuous ventilation to ensure proper drying, setting and curing of joint treatment compounds.
- C. Mix joint treatment compounds in accordance with manufacturer's instructions.
- D. Apply joint treatment materials in accordance with GA 201, GA 216, and manufacturer's instructions.
- E. Tape, fill and sand exposed joints, edges, and corners to produce surface ready to receive surface finishes. Feather embedding and minimum two topping coats onto adjoining surfaces so that camber is maximum 1/32 in. Finishing of taping is not required in concealed spaces and above finished ceilings. Taping is not required above acoustical tile finished on ceiling in classrooms.
- F. Remove and correct defective work.
- G. All gypsum wall board shall be firetaped.

3.05 ACOUSTICAL BLANKET INSTALLATION

- A. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.
- B. Extend acoustical blankets in full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with acoustical materials. Remove projections which interfere with placement.
- C. Apply single or double layer of acoustical blankets of required thickness, as shown or required to make up total thickness.
- D. Install acoustical materials in stud cavities of sound rated partitions, friction fit, except attach at top of partitions. Attachment may be accomplished with staples or tape as recommended by acoustical materials manufacturer.
- E. Closely butt blankets to form uninterrupted sound barrier.

3.06 ACOUSTICAL SEALANT INSTALLATION

- A. Place acoustical sealant within partitions in accordance with manufacturer's instructions. All walls with acoustical blanket insulation shall receive sealant at bottom plate.
- B. Apply acoustical sealant in 3/8 in. diameter continuous beads to both sides of runners, plates and end studs to seal intersection with adjoining structure.
- C. Seal perimeter of gypsum board in noted sound wall to abutting substrate. Seal penetrations of partitions and ceilings.

3.07 METAL STUD INSTALLATION

- A. Install studding in accordance with ANSI/ASTM C754, GA 201 and GA216, manufacturer's instructions and the Drawings. Set floor tracks in sill sealer insulation specified in Section 07210.
- B. Metal Stud Spacing: Sixteen inches on center. Anchor tracks top and bottom at twenty-four inches maximum and six inches from each track end.
- C. Partition Heights: Full height to floor or roof structure above.
- D. Door Opening Framing: Install double full height 20 gage studs at door frame jambs. In accordance with GA219 install stud tracks at frame head height, and between adjacent studs. Screw double studs together with additional flat plate as necessary.
- E. Backing and Blocking: Screw to two studs minimum. Install backing for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware handrails, owner supplied and contractor installed FF&E equipment, and other GWB mounted fixtures as indicated.
- F. Bridging: Install bridging at midpoints of studs or 6 feet maximum for studs over 12 feet high. Use stud track screw attached to each stud.
- G. Coordinate installation of backing, anchors, blocking, electrical and mechanical work placed in or behind partition framing.

3.08 CLEANING

- A. Provide cleaning under provisions of Section 015690 and 017100.
- B. Remove all rubbish, excess materials, and equipment from building and site, clean surrounding surfaces and leave floors clean.

END OF SECTION

DIVISION 09

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SECTION 09 31 10

TILE FLOOR FINISH

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section Includes: Tile and Accessories

1.02 RELATED SECTIONS

- A. Section 079000 Joint Sealants
- B. Section 096800 Carpeting
- C. Section 093120 Tile Wall Finish

1.03 SUBMITALS

- A. Submit under provisions of Section 013400.
- B. 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: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Selection Samples: Samples of actual tiles for selection.
- E. Manufacturer's Certificate:
 - 1. Certify that products meet or exceed specified requirements.
 - 2. For each shipment, type and composition of tile provide a Master Grade Certificate signed by the manufacturer and the installer certifying that products meet or exceed the specified requirements of ANSI A137.1.
- F. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum two years experience.
- B. Single Source Responsibility: Obtain each type and color of tile from a single source. Obtain each type and color of mortar, adhesive and grout from the same source.
- 1.05 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver and store products in manufacturer's unopened packaging until ready for installation.

- B. Protect adhesives and liquid additives from freezing or overheating in accordance with manufacturer's instructions.
- C. Store tile and setting materials on elevated platforms, under cover and in a dry location and protect from contamination, dampness, freezing or overheating.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Crossville, Inc. : PO Box 1168, Crossville, TN 38557 web: crossvilleInc.com

2.02 MATERIALS

- A. General: Following products are for general reference only and are subject to compliance with specified requirements.
- B. Tile Materials:
 - 1. Floor Tile 1 (F1.1): Crossville
 - a. Size: 2" x 4" Mosaic
 - b. Thickness: 10.5 mm
 - c. Style: Retro Active 2.0
 - d. Color: Provide actual samples for Owners selection
 - 2. Floor Tile 2 (F1.1): Crossville
 - a. Size: 12" x 24"
 - b. Thickness: 3/8"
 - c. Style: Basalt
 - d. Color: Provide actual samples for Owners selection
- E. Substitions:
 - 1. Under provisions of Section 016300.
- F. Tile and Grout colors as selected by Architect from manufacturer's standard colors.
- G. Mortar Mix: Product: Hydroment 1900 Epoxy Modified Bostik , Inc. Mortar Admixture
- H. Mortar Additive: Product: Multi-Purpose Acrylic Latex Bostik, Inc. Mortar Admixture and Grout Additive
- I. Grout Mix: Product: Hydroment 1900 Epoxy Modified Bostik, Inc. Mortar Admixture
- J. Grout Additive: Product: Multi-Purpose Acrylic Latex Bostik, Inc. Mortar Admixture and Grout Additive
- K. Substitutions: Under provisions of Section 01630.

2.03 UNDERLAYMENT

- A. All floor tile shall be installed over "Laticrete 9235" Anti-Fracture Membrane. Install per manufactures recommendations.
- B. Conform to TCNA F121-07.

2.04 SETTING MATERIALS

- A. Mortar Mix Materials: ANSI A118.1, premix with acrylic additive.
 - 1. Premix: Sand, cement, chemical mixture compatible with acrylic additive conforming to the following:
 - a. Portland Cement: ASTM C150, Type 1, gray.
 - b. Aggregate: ASTM C144, clean, graded, fine sand.
 - 2. Acrylic additive: ANSI A118.1; CTI-64-1.

2.05 GROUT TYPE

- A. Grout: Cementitious type with acrylic additive.
 - 1. Premix grout: Cement, Sand, and Chemical mixture compatible with acrylic additive.
 - 2. Acrylic Additive: ANSI A118.1; CTI 85-8.
- B. Grout Pigments: Pure mineral pigments, resistant to alkalies, non-fading and weatherproof, colors selected.

2.06 MORTAR AND GROUT MIXTURES

A. Mix and proportion pre-mix mortar and grout materials in accordance with manufacturer's instructions. Verify compatibility of mixtures and additives. Provide from single manufacturer.

2.07 TRIM

- A. Manufacturer: Schluter Systems
 - 1. Floor Profile Trim: 1.4 Schluter-RENO-TK

a. Item #: ATK 125 ACB

b. Provides a sloped transition between tile and carpet at a lower elevation. The profile produces a clean line and protects tile edges against damage.

c. Features a trapezoid-perforated anchoring leg, which is secured in the mortar bond coat beneath the tile, and a sloped surface to eliminate trip hazards.

2. Substitutions: Contractor to coordinate trim profile with substitution carpet or tile.

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PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of setting materials to sub-floor surfaces, and are smooth and flat within tolerances specified in ANSI A137.1
- B. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- C. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Remove any curing compounds or other contaminates.
- C. Vacuum clean surfaces and damp clean.
- D. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- E. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
- F. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.
- B. Lay tile to pattern indicated. Arrange pattern so that a full tile or joint is centered on each wall and that no tile less than 1/2 width is used. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install ceramic accessories rigidly in prepared openings.
- G. Install non-ceramic trim in accordance with manufacturer's instructions.
- H. Install thresholds where indicated.
- I. Sound tile after setting. Replace hollow sounding units.
- J. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

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- K. Allow tile to set for a minimum of 48 hours prior to grouting.
- L. Grout tile joints. Use standard grout unless otherwise indicated.
- M. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
- N. Mortar Bed Thickness: 1-1/4 to 2 inch (32 to 51 mm) maximum, unless otherwise indicated.

3.04 MAINTENANCE

- A. Do not permit traffic over finished floor surface for 72 hours after installation.
- B. Cover floors with kraft paper and protect from dirt and residue from other trades.
- C. Where floor will be exposed for prolonged periods cover with plywood or other similar type walkways.

END OF SECTION

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SECTION 09 31 20

TILE WALL FINISH

- PART 1 GENERAL
- 1.01 SUMMARY
 - A. Section Includes: Tile and Accessories

1.02 RELATED SECTIONS

- A. Section 079000 Joint Sealants
- B. Section 093100 Tile Floor Finish

1.03 SUBMITALS

- A. Submit under provisions of Section 013400.
- B. 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: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Selection Samples: Samples of actual tiles for selection.
- E. Manufacturer's Certificate:
 - 1. Certify that products meet or exceed specified requirements.
 - 2. For each shipment, type and composition of tile provide a Master Grade Certificate signed by the manufacturer and the installer certifying that products meet or exceed the specified requirements of ANSI A137.1.
- F. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum two years experience.
- B. Single Source Responsibility: Obtain each type and color of tile from a single source. Obtain each type and color of mortar, adhesive and grout from the same source.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging until ready for installation.
- B. Protect adhesives and liquid additives from freezing or overheating in accordance with manufacturer's instructions.

C. Store tile and setting materials on elevated platforms, under cover and in a dry location and protect from contamination, dampness, freezing or overheating.

PART 2 PRODUCTS

2.01 TILE MANUFACTURERS

A. Crossville, Inc. : PO Box 1168, Crossville, TN 38557 web: crossvilleInc.com

2.02 MATERIALS

- A. General: Following products are for general reference only and are subject to compliance with specified requirements.
- B. Tile Materials:
 - 1. Wall Tile 1 (WT-1): Crossville
 - a. Size: 6" x 24"
 - b. Thickness: 10.5 mm
 - c. Syle: Retro Active 2.0
 - d. Color: Provide actual samples for Owners selection
 - e. Finish: Polished (PO)
 - 2. Wall Tile 2 (WT-2): Crossville
 - a. Size: 6" x 24"
 - b. Thickness: 10.5 mm
 - c. Syle: Retro Active 2.0
 - d. Color: Provide actual samples for Owners selection
 - e. Finish: Polished (PO)
 - 3. Wall Tile 3 (B1): Crossville
 - a. Size: 6" x 12" Cove Base with outside and inside corners
 - b. Thickness: 10.5 mm
 - c. Syle: Retro Active 2.0
 - d. Color: Provide actual samples for Owners selection
 - e. Finish: Polished (PO)

C.	Mortar Mix: Top UPCO	Product: Top White Anti-Slip Product: Tile Mate 765
D.	Mortar Additive: Top	Product: Top 400 Acrylic
	UPCO	Product: Multi-Purpose Acrylic Latex
		Mortar Admixture and Grout Additive
Ε.	Grout Mix:	
	Тор	Product: Sanded Ceramic Tile Grout
	UPCO	Product: Hydroment Ceramics Tile Grout

F.

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Grout Additive:	
Тор	Product: Top 200 Grout Strengthener
UPCO	Product: Multi-Purpose Acrylic Latex
	Mortar Admixture and Grout Additive

G. Substitutions: Under provisions of Section 016300.

2.03 SETTING MATERIALS

- A. Mortar Mix Materials: ANSI A118.1, premix with acrylic additive.
 - 1. Premix: Sand, cement, chemical mixture compatible with acrylic additive conforming to the following:
 - a. Portland Cement: ASTM C150, Type 1, white.
 - b. Aggregate: ASTM C144, clean, graded, fine sand.
 - 2. Acrylic additive: ANSI A118.1; CTI-64-1.
- B. Skim Coat: Plastic acrylic-portland cement mortar, same as above, except increased proportion of sand and coarser sand (No. 30 mesh) to suit condition of use.
- C. Work tile joints uniform in width, subject to variance in tolerance allowed in tile size. Joints: Watertight, without voids, cracks, excess mortar, or grout.
- D. Backer Board: "Dens-sheild"
 - 1. Fasteners: 1 in. buglehead Type S High-Low screws.
 - 2. Joint Tape: As recommended by backer board manufacturer for application.

2.04 GROUT TYPE

- A. Grout: Sanded type with acrylic additive.
 - 1. Premix grout: Cement, Sand, Chemical mixture compatible with acrylic additive.
 - 2. Acrylic Additive: ANSI A118.1; CTI 85-8.
- B. Grout Pigments: Pure mineral pigments, resistant to alkalies, non-fading and weatherproof, colors selected.

2.05 MORTAR AND GROUT MIXTURES

A. Mix and proportion pre-mix setting bed and grout materials in accordance with manufacturer's instructions. Verify compatibility of mixtures and additives. Provide from single manufacturer.

PART 3 EXECUTION

- 3.01 INSPECTION
 - A. Tile may be installed over most structurally sound substrates, if they are clean, smooth, dry and free of wax, soap scum and grease. Any damaged, loose or uneven areas must be repaired, patched and leveled.

3.02 PREPARATION

A. Remove any moldings, trim, appliances, etc., which could interfere with installation. Door jambs may be undercut for tile to slip under.

3.03 INSTALLATION

- A. Begin by finding the center point of the wall, using a level to draw a plumb line in the wall's center.
- B. Lay out a row of loose tiles across the bottom of the wall from the center line leaving uniform joints between tiles. With the level, continue the line around all side walls to be tiled. This is a guideline for the first row of tiles to be set above.
- C. Mix only enough adhesive to be used within 30 minutes. Spread a 1/4" coat on the surface of one grid area, using the flat side of the trowel. Do not cover guidelines.
- D. Use the notched side of trowel to comb adhesive into standing ridges by holding trowel at a 45degree angle. Then remove excess adhesive, leaving a uniform, ridged setting bed. Don't spread a larger area than can be set in 15 minutes.
- E. Measure tiles to be cut carefully and mark with a pencil or felt-tip pen. Make straight or diagonal cuts with a tile cutter, curved cuts with a nipper (chipping away small pieces for best results), full-length curved cuts with a rod saw. Sharp-cut edges may be smoothed with a carborundum stone.
- F. Set tiles one at a time using a slight twisting motion. Don't slide tiles into place. Insert tile spacers as each tile is set, or leave equal joints between tiles. Fit perimeter tiles in each grid last, leaving 1/4" gap between tile and wall.
- G. When grid is completely installed, tap in all tiles with a rubber mallet or hammer and wood block, to ensure a good bond and level plane. Remove excess adhesive from joints with a putty knife, and from tile with a damp sponge.

END OF SECTION

SECTION 09 51 10

ACOUSTICAL CEILINGS

PAGE 1 OF 4

PART 1 GENERAL

- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Suspended metal grid system complete with all trim.
 - 2. Lay-in ceiling panels.
 - B. Related Work Specified Elsewhere:
 - 1. Section 062000 Finish Carpentry
 - 2. Section 092500
 - 3. Section 109250

Gypsum Wallboard Miscellaneous Specialties

C. Reference Standards:

- 1. American Society for Testing and Materials (ASTM):
 - a. C635-83 Metal Suspension System for Acoustical Tile and Lay-In Panel Ceilings.
 - b. C636-76 (1981) Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - c. D1761-77 Mechanical Fasteners in Wood.
 - d. E84-84 Surface Burning Characteristics of Building Materials.
- 2. Uniform Building Code (UBC) : UBC Standard 47-18, including Part III Lateral Design Requirements.

1.02 QUALITY ASSURANCE

A. Provide acoustical panels and suspension materials bearing UL Classification marking.

1.03 SUBMITTALS

- A Clearly indicated grid layouts and related dimensioning, junctions with other work or ceiling finishes, inter-relation of mechanical and electrical items related to system.
 - 1. Show insert and hanger spacing and fastening details, splicing method for main and cross runners, acoustical unit support at lighting fixtures, and installation details.
 - 2. Include detailed locations of lighting fixtures, sprinkler heads, detectors, ceiling diffusers, air return grilles and air volume control dampers.
- B. Submit manufacturer's information, installation instructions and product data under provisions of Section 013400.
- C. Furnish suspension system manufacturer's lateral loading capacity and displacement or elongation characteristics for proposed systems indicating:
 - 1. Bracing pattern and wire sizes.
 - 2. Tension and compression force capabilities of main runner splices, cross runner or connections and expansion devices.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Do not install acoustical ceiling until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead mechanical work is completed, tested, and approved.
- B. Permit wet work to dry prior to commencement of installation.
- C. Maintain uniform temperatures of minimum 61 degrees F and humidity of 20 percent to 40 percent prior to, during, and after installation.

1.05 EXTRA STOCK

- A. Furnish extra materials under provisions of Section 017500.
- B. Furnish not less than the percentage of each type acoustical ceiling material supplied as noted below. Furnish fill original, unopened, undamaged cartons only.
 - 1. Acoustical tiles: One percent, minimum.
 - 2. Acoustical panels: Two percent, minimum.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustical Panels and Tiles: Armstrong World Industries, Inc.
- B. Suspension System: Armstrong World Industries, Inc.

2.02 ACOUSTICAL CEILING UNITS

- A. Acoustical Panels Basis of Design:
- B. Acoustical Ceiling System **ACT 1** : Armstrong / Cirrus #581
 - 1. Thickness: 7/8"
 - 2. Color: White
 - 3. Size: 24in X 24in
 - 4. Edge Profile: Tegular for interface with compatible Armstrong grid. The suspension system must be leveled to within 1/4" in 10 feet and must be square to within 1/16" in 2 feet.
 - 5. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.90.
 - 6. Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton 190.
 - 7. Flame Spread: ASTM E 1264; Class A (UL)
 - 8. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.86
 - 9. Dimensional Stability: HumiGuard Plus temperatures up to 120 degrees F and high humidity excluding only exterior use, use over standing water, and direct contact with moisture .
 - 10. Mold/Mildew Inhibitor: The front and back of the product have been treated with BioBlock, a paint that contains a special biocide that inhibits or retards the growth of mold or mildew, ASTM D 3273.
 - 11. Acceptable Product: Optima Vector, 3908, as manufactured by Armstrong World Industries.

- C. Acoustical Ceiling System **ACT 2** : Armstrong / Fine Fissured #1729
 - 1. Thickness: 5/8"
 - 2. Color: White
 - 3. Size: 24in X 48in
 - 4. Edge Profile: Tegular for interface with compatible Armstrong grid. The suspension system must be leveled to within 1/4" in 10 feet and must be square to within 1/16" in 2 feet.
 - 5. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.55.
 - 6. Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton 190.
 - 7. Flame Spread: ASTM E 1264; Class A (UL)
 - 8. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.83
 - 9. Dimensional Stability: HumiGuard Plus temperatures up to 120 degrees F and high humidity excluding only exterior use, use over standing water, and direct contact with moisture .
 - Mold/Mildew Inhibitor: The front and back of the product have been treated with BioBlock, a paint that contains a special biocide that inhibits or retards the growth of mold or mildew, ASTM D 3273.
 - 11. Acceptable Product: Optima Vector, 3908, as manufactured by Armstrong World Industries.
- PART 3 EXECUTION
- 3.01 INSPECTION
 - A. Verify that existing conditions are ready to receive work.
 - B. Beginning of installation means installer accepts condition of existing substrates.
- 3.02 INSTALLATION SUSPENDED GRID AND LAY-IN PANELS
 - A. Install acoustical ceiling systems in accordance with UBC Standard 47-18, including Lateral Design Requirements, and ASTM C 636 to produce finished ceiling true to lines and levels, and free from warped, soiled, or damaged grid and lay-in panels.
 - B. Install fire rated ceiling systems in accordance with UL requirements, including light fixture protection.
 - C. Install ceiling systems in manner capable of supporting all superimposed loads, with maximum deflection of 1/360 of span, and maximum surface deviation of 1/8 in. in 12 ft.
 - D. Install after major above-ceiling work is complete. Coordinate location of hangers with other work. Ensure layer of hangers and carrying channel locations accommodate fittings and units of equipment to be placed after installation of ceiling grid system.
 - E. Support main runners from hangers attached directly to structure.
 - 1. When obstructions preclude direct attachment to structure use trapeze suspension for spans exceeding 48 in. Form trapeze from two carrying channels back to back.
 - 2. Provide lateral force bracing in conformance with UBC Standard 47-18, Part III.
 - 3. Anchor hangers with .216 in. diameter shaft screw-eyes attached to bottom chord of wood joists; minimum 2 in. penetration of screw shaft into underside of wood chord where acceptable to Owner's Representative, unless otherwise required for assembly rating.
4.

K+A designstudios

Do not screw into plywood roof deck.

- F. Hang independently of walls, columns, ducts, pipes, and conduit. Where carrying members are spliced avoid visible displacement of longitudinal axis or face plane of adjacent member.
- G. Center ceiling systems on room axis leaving equal border pieces, unless indicated otherwise.
- H. Do not support fixtures from or on main runners or cross runners if weight of fixture exceeds 56 lbs. or causes total dead load to exceed deflection capability, whichever weight is less.
 - 1. Space hanger wire 48 in. o.c. maximum.
 - 2. Install additional hangers at terminal ends of each suspension member, 8 in. from vertical surfaces.
 - 3. Support fluorescent lighting fixture safety chains independent of grid and grid suspension system.
 - 4. Do not splay wires more than 5 in. in 4 ft. vertical drop without countersplaying.
- I. Install edge moldings at intersection of ceiling and vertical surface, using maximum lengths, straight, true to line and level. Miter corners. Provide edge moldings at junctions with other ceiling finishes.
- J. Fit acoustical ceiling materials in place, free from damaged edges and other defects detrimental to appearance and function. Fit border units neatly against abutting surfaces.
- K. Install acoustical ceiling materials level, in uniform plane and free from twist, warp and dents.

3.03 ADJUSTMENTS

A. Adjust any sags and twists which develop in ceiling system and replace any part damaged or faulty.

SECTION 09 65 00

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RESILIENT FLOORING

PART 1 GENERAL

1.01 SUMMARY

- A. Extent and location of homogeneous linoleum sheet flooring is shown on the Drawings, and includes adhesive and heat welded seams installation.
- B. Refer to Div. 096510 for resilient wall bases, reducer strips, metal edge strips, stair treads and risers, and other resilient flooring accessories.

1.02 SUBMITTALS

- A. Submit product data, warranty documents, and verification samples for colors and patterns for linoleum specified. Submit material safety data sheets for all products used in installation.
- B. Submit maintenance data to the General Contractor for installed materials for inclusion in "Operating and Maintenance Manual" specified in Div. 017000 Project Closeout section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
- C. Provide Owner with any extra stock of each color of material installed.

1.03 QUALITY ASSURANCE

A. Installer is to be experienced in performing work of this section, who has specialized in the installation of work similar to that required for this project, and who is acceptable to product manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Store rolls vertically in fully enclosed areas, protected from exposure to harmful weather conditions and at uniform temperature and at uniform temperature conditions recommended by manufacturer (68°F for 72 hours prior to installation).

1.05 PROJECT CONDITIONS

- A. In accordance with manufacturer's recommendations, areas to receive flooring shall be clean, fully enclosed, weathertight and maintained at a uniform temperature of at least 68°F for 72 hours prior to, during, and after installation. Condition flooring materials for the same uniform temperatures.
- B. Install resilient flooring after finishing operations, including painting and ceiling operations, have been completed.
- C. Do not install resilient flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by flooring manufacturer's recommended bond and moisture test.
- 1.06 EXTRA STOCK

- A. Provide not less than 5% for fewer than 100 sq. ft. and 3% for over 100 sq. ft. for each type, color, pattern, and size installed.
- PART 2 PRODUCTS
- 2.01 RESILENT TILE FLOORING
 - A. Manufacturer: Gerflor
- 2.02 PHYSICAL CONSTRUCTION
 - A. Resilient #1: (RT-1)
 - 1. Manufacturer: Gerflor
 - 2. Style: SAGA 2
 - 3. Color: To be determined by Architect, provide actual samples
 - 4. Construction: VLT Tile Flooring
 - 5. Size: 19.685" x 19.685"
 - 6. Overall Thickness: .18 inch
 - 7. Wear Layer: 0.7 mm
 - B. Resilient #2: (RT-2)
 - 8. Manufacturer: Gerflor
 - 9. Style: Mipolam Elegance
 - 10. Color: To be determined by Architect, provide actual samples
 - 11. Construction: Homogeneous Sheet
 - 12. Roll Width: 6'-6"
 - 13. Overall Thickness: .08 inch
 - 14. Wear Layer: Homogeneous
 - 15. Seams: Heat Welded Seams
- 2.03 ENVIRONMENTAL
 - A. Recycled Content: 5% Post-Consumer Recycled Content
 - B. Floor Score Indoor Air Quality: SCS Certified
 - C. CHPS -1350 Indoor Air Quality: Passed and Listed
 - D. NSF/ANSI-332 Certification: Gold
- 2.04 TESTING
 - A. ASTM Specification (F-1913): Exceeds
 - B. HUD/FHA Requirements: Exceeds
 - C. Electrical Resistance, EN1815: < 2 kv
 - D. Flooring Radiant Panel Test (ASTM-E-648): > .45 watts/cm2, passes (Class 1)
 - E. N.B.S. Smoke Chamber Test (ASTM-E-662): <450 Passes

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F. Static Coefficient of Friction: Meets ADA Guidelines

2.05 WARRANTIES

- A. Warranty:
 - 1. 10 Year Commercial Warranty

PART 3 EXECUTION

3.01 WASTE MANAGEMENT

A. Separate and recycle off cuts and waste materials in accordance to the maximum extent economically feasible. Place used sealant and adhesive tubes and containers in areas designated for hazardous waste.

3.02 EXAMINATION

A. Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.

3.03 PREPARATION

- A. Protect adjacent work areas and finish surfaces from damage during product installation.
- B. Substrates must be dry, clean, smooth and free from paint, varnish, wax, oils, solvents and other foreign matter. In renovation or remodel work, remove any existing adhesive residue so that no ridges or puddles are evident and a thin, smooth film remains.
- C. When using D-230, remove any existing adhesive residue so that 80% of the overall area of the original substrate is exposed. If these requirements are not followed, curled and/or loose tile could result. For Tile-On, remove wax or other finishes with a commercially available liquid wax stripper. Replace or repair indented or otherwise damaged areas.
- D. Allow all flooring materials and adhesives to condition to the room temperature a minimum of 48 hours before starting the installation.
- E. The area to receive resilient flooring should be maintained at a minimum of 65 degrees F (18 degrees C) and a maximum of 100 degrees F (38 degrees C) for 48 hours before, during and for 48 hours after completion. When using S-230 Epoxy Adhesive the maximum room temperature should not exceed 85 degrees F (29 degrees C).
- F. During the service life of the floor the temperature should never fall below 55 degrees F (13 degrees C). The performance of the flooring material and adhesives can be adversely affected below this minimum temperature.
- G. Conduct calcium chloride tests or percent relative humidity tests. Bond Tests should also be conducted for compatibility with the substrate. Please refer to Section IV, Subfloors and Underlayments.
- H. Radiant-heated substrates must not exceed a maximum surface temperature of 85 degrees F (29 degrees C).

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I. Concrete floors should be tested for alkalinity. The allowable readings for the installation of Armstrong flooring are 5 to 9 on the pH scale.

3.04 INSTALLATION

- A. Installation Adhesive, Porous Subfloor: V-82 / Full Spread
- B. Installation Adhesive, Non-Porous Subfloor: V-95 / Full Spread (Must use V-95 under OR tables, hospital beds, and heavy rolling loads).
- C. Chemical Seam Sealer: MCS-42 with VST-96 Applicator Kit
- D. Installation In Areas With Topical Moisture: V-95 Adhesive must be used, seams must be properly sealed, and perimeter/edges must be protected.
- E. Heat Weld Seaming: Commercial Solid Weld Roots.
- F. Comply with manufacturer's product data, including product technical bulletins, product catalog and carton installation instructions.
- G. Scribe, cut, fit flooring to butt tightly to vertical surfaces, permanent fixtures and built-in furniture, including pipes, outlets, edgings, thresholds, nosings, and cabinets. Extend flooring into toe spaces, door reveals, closets, and similar openings. Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.
- H. Installer is defined as a competent, experienced person assigned to install the flooring material.
- I. Installer must be experienced and competent in the installation of resilient rubber flooring materials. Installer must install flooring per instructions provided by manufacturer.

3.05 CLEANING

- A. Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.
- B. Remove visible adhesive and other surface blemishes using cleaning methods recommended by resilient flooring manufacturer. Sweep and vacuum floor. Do not wash floor until after time period recommended by resilient flooring manufacturer. Damp-mop to remove black marks and soil.
- C. Protect installed flooring finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.
- D. Execute initial maintenance procedures after flooring installation as recommended by flooring manufacturer.

SECTION 09 65 10 - RESILIENT BASE

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Preparation of substrate surfaces
 - 2. Application of rubber base.
 - 3. Cleaning of all surfaces and areas of work.
 - B. Related Work Described Elsewhere:
 - 1. Cast-In-Place Concrete
 - 2. Finish Carpentry

3. Resilient Flooring

- 4. Carpeting
- C. References:
 - 1. FF SS-W-40, Wall Base: Rubber and Vinyl Plastic

1.02 SUBMITTALS

- A. Submit samples and product data under provisions of Section 013400.
- B. Include duplicate 2 in. long samples of base selected.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Maintain minimum 70 °F air temperature at installation area for three days prior to, during, and for 48 hours after installation.

Section 033000

Section 062000

Section 096500

Section 096800

B. Store flooring materials in area of application. Allow three days for material to reach equal temperature as area.

1.04 EXTRA STOCK

A. Provide not less than 5% for fewer than 100 sq. ft. and 3% for over 100 sq. ft. for each type, color, pattern and size installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. General: Following products are for general reference only and are subject to compliance with specified requirements.

BASE:

1. Roppe Product: Rubber Cove Base

2.02 BASE MATERIALS

- A. Provide 4" at locations shown on the drawings.
- B. Rubber Base: Conforming to FS SS-W-40,

2.03 ADHESIVES

A. Primers and Adhesives: Waterproof; of types recommended by manufacturer for specified material.

PART 3 EXECUTION

3.01 PREPARATION

A. Remove substrate ridges and bumps. Fill low spots, cracks, joints, holes and other defects with filler.

3.02 INSTALLATION

- A. Fit joints tight and vertical. Maintain minimum measurement of 18 in. between joints.
- B. Miter internal corners. Use premolded sections for exposed ends and external corners, except wrap base around corners of bullnosed CMU.
- C. Install base on solid backing. Adhere tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other obstructions.
- E. Install straight and level to variation of plus or minus 1/8 in. over 10 ft.
- F. Install coved base in carpeted areas.

3.03 CLEANING

- A. Remove excess adhesive from base, and wall surfaces without damage.
- B. Clean base surfaces in accordance with manufacturer's instructions.

SECTION 09 68 00

CARPETING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Preparation of surfaces to receive carpeting.
 - 2. Glue-down carpeting on floor surfaces where indicated, complete with required accessories.
 - 3. Install edge strips where carpeting terminates at other floor finishes.
- B. Related Work Described Elsewhere:
 - 1. Cast-In-Place Concrete
 - 2. Resilient Flooring
 - 3. Resilient Base
 - 4. Tile Floor Finish

Section 096510 Section 093110

Section 033000

Section 096500

- C. References:
 - 1. American Society for Testing and Materials (ASTM):
 - a. D1335-67 (1972) Tuft Bind of Pile Floor Coverings.
 - b. E84-84 Surface Burning Characteristics of Building Materials.
 - c. Carpet and Rug Institute (CRI)
 - d. National Bureau of Standards (NBS) : Flooring Radiant Panel NBSIR-75-950

1.02 QUALITY ASSURANCE

A. Installer Qualifications: Minimum 3 years experience in installation of carpeting on projects similar in size and scope and approved in writing by accepted carpet manufacturer.

1.03 SUBMITTALS

- A. Submit samples, product date, manufacturer's installation instructions, and shop drawings under provisions of Section 013400.
 - 1. Samples: Submit not less than two sq.ft. of specified carpet in color, yarn and pattern selected and 3 in. length each type edge strip.
 - 2. Shop Drawings: Layout drawings showing seam locations and edge strips.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver and handle materials under provision of Section 016100.
 - 1. Deliver materials in manufacturer's original, unopened protective packaging with manufacturer's labels, mill register number of each roll and product identification intact and legible.
 - 2. Deliver adhesives and primers in unopened containers.

- 3. Deliver materials to site only when acceptable storage facilities for proper storage are available.
- B. Store and protect materials under provisions of Section 016200.
 - 1. Store adhesives at working temperatures per label instruction. Do not begin installation until a sufficient quantity of materials to complete all spaces is received.
 - 2. At earliest opportunity, open packaging and visually inspect sufficient carpet material to detect obvious deviations from required material including:
 - a. face yarn color
 - b. pattern
 - c. type of construction
 - d. backing type
 - e. pile height
 - f. gauge or pitch
 - g. stitches per inch
 - 3. Replace packaging and report deviations to Owner's Representative at time of detection.

1.05 MAINTENANCE DATA

- A. Submit maintenance manual under provisions of Section 017300.
- B. Maintenance Manual: Printed maintenance manual written by carpet manufacturer's technical service department. Submit two hard covered copies to Owner's Representative.
- C. Furnish as-built shop drawings indicating direction of lay and locations of all seams (especially cross seams).

1.06 EXTRA MATERIALS

- A. Furnish extra stock under provision of Section 017500.
- B. Maintenance materials: Furnish for replacement and maintenance five percent overrun of carpet used on Project and sufficient specified adhesive to apply overrun of carpet.
 - 1. Overrun on full width, uncut rolls.
 - 2. Upon delivery of carpet, furnish verification of total yardage delivered by mill showing exact amount of overrun.
 - 3. In addition, carpet remnants larger than one foot square shall be bundled (carpet remnants larger than four foot square shall be rolled), tied, marked for size and delivered in accordance with Owner Representative's directions.

1.07 WARRANTY

A. Furnish manufacturer's written 5 year warranty under provisions of Section 017400.

- B. Furnish services required to correct material or installation defects at no additional cost to Owner for a period of five years after date of final acceptance.
- C. Guarantee carpeting for five years against wear.

1.08 JOB CONDITIONS

- A. Environmental Requirements:
 - 1. Maintain minimum temperature of 70 °F to 85 °F and humidity of 20 percent to 40 percent three days before, during, and four days after installation of carpet.
 - a. Following this period maintain minimum room temperature at not less that 55 °F and humidity conditions similar to those normally expected to exist when occupied by Owner.
 - b. Sequencing: Do not install carpet until work of acoustical ceilings, resilient flooring and fixed casework is complete.

PART 2 PRODUCTS

2.01 CARPETING MATERIALS

- A. Manufacturer: Shaw
- B. Collection: Hand Drawn
 - 1. Carpet 1:
 - a. Style: Stipple 5T116

b. Color: Contractor to provide color samples for Architect's selection.

- 2. Carpet 2:
 - a. Style: Lineweight Tile 5T114
 - b. Color: Contractor to provide color samples for Architect's selection.
- C. Carpet Tile Details: Hand Drawn
 - 1. Construction: Multi-level pattern loop
 - 2. Fiber: Solution Q Extreme
 - 3. Dye method: 100% solution dyed
 - 4. Tufted Weight: 14.0
 - 5. Guage: 1/10
 - 6. Stitches per inch: 11.0

7. Average Density: 8,400

8. Product Size: 18" x 36"

2.02 ADDITIONAL MATERIALS

- A. Gripper Tape: As recommended by manufacturer and approved by Owner's Representative, to allow flush, tight joining of rolls and pieces.
- B. Edge & Divider Strips: Vinyl, of shapes and sizes indicated, and as appropriate to condition of use where not otherwise indicated. Include accessories as detailed and required. Coordinate installation of edge strips with edge strips specified under Section 09650.
 - 1. At Concrete: Mercer Plastics Co. Imperial Carpet Reducer, Stock No. 900, or equal.
 - 2. At Vinyl Composition Tile and Sheet Vinyl: Mercer Plastics Co. Model 150; Johnsonite Model CE-XX-B x CDB-XX-B; Roppe #153 X 155, or equal.
 - 3. At Ceramic Tile: Mercer Plastics Co. Snap Down Std. Edge Unit, Stock No. 333, or equal.
 - 4. At changes in direction of carpet and other locations: As shown, or as otherwise appropriate to condition of use.
- C. Trim: Refer to Section 09311 Tile Floor Finish for carpet/tile transition trim.
- D. Sub-Floor Filler: White premix latex, mix with water to produce cementitious paste.
- E. Primers and Adhesives: Carpet and seam adhesives; of types recommended by carpet manufacturer for specific materials and substrates that is V.O.C. free.

PART 3 EXECUTION

3.01 PREPARATION

- A. Carefully check all field conditions, measurements, and dimensions of areas to receive carpet to assure proper fit.
- B. Clean floors of dust, dirt, solvents, oil, grease, paint, plaster, and other substances detrimental to proper performance of adhesive and carpet. Allow floors to thoroughly dry.
- C. Ensure floors are level, with maximum surface variation of 1/4 in. in 10 ft. noncumulative.
- D. Ensure concrete floors are free from scaling and irregularities and exhibit neutrality relative to acidity and alkalinity.
- E. Use an approved cementitious filler to patch cracks, small holes, and for leveling.
- F. Do not proceed with installation until unsatisfactory conditions have been corrected.
- G. Prohibit traffic until filler has cured.
- H. Vacuum floor surface.

I. Coordinate with installation of resilient base specified under Section 09651.

3.02 CARPET LAYOUT

- A. Layout in accordance with reviewed layout drawings and as supplemented below.
- B. Layout rolls of carpet. Verify carpet edge match before cutting to ensure minimal color variation. Minimize number of carpet seams.
- C. Do not locate seams at high traffic pivot points, and perpendicular to doors.
 - 1. Locate seams at doorways parallel to and centered directly under doors in closed position.
 - 2. Neatly cut and securely fit cutouts at interruptions.
- D. All carpet shall be laid out with the seams in the same north-south direction.

3.03 INSTALLATION

- A. Install in accordance with finish plan.
- B. Apply primer in recommended manner in quantity recommended by manufacturer, and as required by adhesive manufacturer to ensure proper adhesion.
- C. Spread adhesive in quantity recommended by manufacturer after primer application where required by adhesive manufacturer to ensure proper adhesion over full area of installation. Apply only enough adhesive to permit proper adhesion of carpet before initial set. Roll lightly to eliminate air pockets and ensure uniform bond.
- D. Double cut carpet as required for intended butt seam and pattern match. For length seams, cut carpet seams between two rows of yarn for full length of seam, making sure not to jump over either side yarn. Make cuts straight, true to lines and unfrayed.
- E. Fit seams straight, not crowded or peaked, free of gaps. Treat seams with seam adhesive.
- F. Install edge strips at intersections of differing flooring materials, where carpet changes directions and at exposed edges where carpeting terminates, full length pieces only. Butt ends tight to vertical surfaces. Where splicing cannot be avoided, butt ends tight and flush. Miter corners where required and fit joints tightly. Provide edge moldings at junctions with other interruptions and where shown.
- G. Scribe carpeting to walls, columns, cabinets, floor outlets and other appurtenances to produce tight joints. Fit tight to vertical surfaces without gaps where no base is scheduled.
- H. Do not place heavy objects such as furniture on carpeted surfaces for minimum of 24 hours or until adhesive is set.
- I. Entire carpet installation is to be laid tight and flat to substrate, well adhered, and present a uniform pleasing appearance. Ensure monolithic color, pattern, and texture match within any one area.
- 3.04 PROTECTION

A. Prohibit traffic from carpeting for 24 hours after installation, and do not place heavy objects such as furniture on carpet surfaces until at least seven days after installation.

3.05 CLEANING

- A. Immediately remove with solvent all adhesive spots and smears from carpet and adjacent exposed surfaces as they occur. Remove excess adhesive from floor, wall and base surfaces without damage.
- B. Remove from site all rubbish, wrapping paper, salvages and debris.
- C. Thoroughly vacuum clean carpet. Protect from soiling and construction damage until accepted by Owner under provisions of Sections 016200 and 017100. Package and deliver remnants as specified above.

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SECTION 09 90 00

PAINTING

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Prepare surfaces to receive finish.
 - 2. Finish surfaces as indicated in schedule at end of this Section.
 - B. Related Work in Other Sections:

1.	Joint Sealants	Section 079000
2.	Mechanical Insulation	Section 230700

1.02 QUALITY ASSURANCE

A. Container labels shall include manufacturer's name, type of paint, stock number, color, label analysis, and where applicable instructions for reducing.

1.03 MOCKUP

- A. Before proceeding with paint application, finish one complete surface of each color scheme required, clearly indicating selected colors, finish texture, materials, and workmanship. For spray application, paint surface not smaller than 100 sq.ft. as Project standard.
- B. If accepted, sample area will serve as a minimum standard for work throughout Work.

1.04 SUBMITTALS

- A. Submit materials list, product data, samples and manufacturer's instructions under provisions of Section 013400.
- B. Submit manufacturer's product data on each paint material used on project.
- C. Prepare 12 in. x 12 in. samples of finishes when requested by Owner. Transparent finishes on solid lumber may be 4 in. x 8 in. When possible, apply finishes on identical type materials to which they will be applied on job.
- D. Identify each sample as to finish, formula, color name and number, sheen name, and gloss units.
- E. Colors selected by Owner prior to commencement of work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver paint materials under provisions of Section 016100 in sealed original labeled container.
- B. Store and protect materials under provisions of Section 016200. Provide adequate storage facilities. Store paint materials at minimum ambient temperatures of 45 °F in well ventilated area.

C. Take precautionary measure to prevent fire hazards and spontaneous combustion.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture contents of surfaces are below following maximums: Refer to Section 015000.
 - 1. Plaster and gypsum wallboard: 12 percent.
 - 2. Concrete and Concrete Masonry Units: 12 percent.
 - 3. Interior Located Wood : 12 percent
 - 4. Exterior Located Wood: 19 percent
- B. Ensure surface temperatures or the surrounding air temperature is above 45°F before applying finishes. Minimum application temperatures for latex paints for interior work are 60°F and 50°F for exterior work. Minimum application temperature for varnish finishes is 75°F.
 - 1. Do not paint exterior surfaces after September 30th unless surrounding are temperature is above 45°F.
- C. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 45°F, and 75°F, as applicable, for 24 hours before, during and 48 hours after applications of finishes.
- D. Provide minimum 25 foot candles illumination on surfaces to be finished.

1.07 MAINTENANCE DATA

- A. Submit maintenance data under provisions of Section 017300.
- B. Indicate cleaning methods, cleaning solutions recommended, and stain removal methods recommended.

1.08 EXTRA STOCK

- A. Furnish extra stock under provisions of Section 017500. Leave on premises, where directed by Owner, not less than one gallon each type and color used.
- B. Tightly seal and clearly label containers for identifications.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Columbia Paints
- B. Sherman Williams
- C. ICI Paints
- D. Glidden Coatings and Resins
- E. Parker Paints
- F. Substitutions: Under provisions of Section 016300.

2.02 PAINT AND ENAMEL MATERIALS

- A. Paint and Enamel: Type and brand listed as manufactured by ICI Paints, unless otherwise noted.
 - 1. Owner's review of other acceptable manufacturer's products may include reference to "Architectural Specification Manual" published by Specifications Services and the Washington State Council Painting and Decorating Contractors of America. Provide first line materials.
- B. Paint Accessory Materials: Linseed oil, shellac, turpentine and other materials not specifically indicated herein but required to achieve the finishes specified shall be of high quality and acceptable manufacturer.
- C. Paint: Ready-mixed except field catalyzed coatings. Pigments fully ground maintaining a soft paste consistency, readily and uniformly dispersed to complete homogeneous mixture.
- D. Paint shall have good flowing and brushing properties and dry or cure free of streaks and sags.

2.03 FINISHES

- A. Refer to surface finish schedule at end of this Section.
- B. Provide finish for all exposed materials factory primed or unfinished, unless specifically stated as not requiring finish.
- 2.04 PAINT SYSTEMS
 - A. INTERIOR PAINT SYSTEMS: COLUMBIA PAINT AND COATINGS
 - 1. ON DRYWALL IPS 10 (*General*) **Italicized Text Signifies Designer Notes* COLOR: COLUMBIA- TO BE DETERMINED BY ARCHITECT
 - a. FIRST COAT: 02-735 PREMIUM PRO INTERIOR LATEX ENAMEL UNDERCOATER
 b. FINISH COAT: 02-255 PREMIUM PRO ACRY-PLUS INTERIOR LATEX EGGSHELL
 - 2. ON DRYWALL IPS 10 (*Accent Color #1*) COLOR: COLUMBIA- TO BE DETERMINED BY ARCHITECT
 - a. FIRST COAT: 02-735 PREMIUM PRO INTERIOR LATEX ENAMEL UNDERCOATER
 - b. FINISH COAT: 02-255 PREMIUM PRO ACRY-PLUS INTERIOR LATEX EGGSHELL
 - 3. ON DRYWALL IPS 10 (*Accent Color #2*) COLOR: COLUMBIA- TO BE DETERMINED BY ARCHITECT
 - a. FIRST COAT: 02-735 PREMIUM PRO INTERIOR LATEX ENAMEL UNDERCOATER
 - b. FINISH COAT: 02-252 PREMIUM PRO ACRY-PLUS

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INTERIOR LATEX SEMI-GLOSS

- 4. ON DRYWALL (IPS 20) COLOR: COLUMBIA- TO BE DETERMINED BY ARCHITECT
 - a. FIRST COAT: 02-735 PREMIUM PRO INTERIOR LATEX ENAMEL UNDERCOATER
 - b. FINISH COAT: 02-252 PREMIUM PRO ACRY-PLUS INTERIOR LATEX SEMI-GLOSS
- 5. ON CONCRETE BLOCK (IPS 30) COLOR: COLUMBIA- TO BE DETERMINED BY ARCHITECT
 - a. FIRST COAT: 01-0443 PROFESSIONAL HIGH BUILD INT/EXT LATEX BLOCK FILLER
 - b. FINISH COAT: 02-250 PREMIUM PRO ACRY-PLUS INTERIOR LATEX FLAT
- 6. ON CONCRETE BLOCK (IPS 40) COLOR: COLUMBIA- TO BE DETERMINED BY ARCHITECT
 - a. FIRST COAT: 01-0443 PROFESSIONAL HIGH BUILD INT/EXT LATEX BLOCK FILLER
 - b. FINISH COAT: 02-250 PREMIUM PRO ACRY-PLUS INTERIOR LATEX FLAT
- 7. ON STEEL (IPS 50) COLOR: COLUMBIA- TO BE DETERMINED BY ARCHITECT
 - a. FIRST COAT: 05-2554 PROFESSIONAL METAL PRIMER
 - b. FINISH COAT: 01-235 PREMIUM PRO EXTERIOR 100% ACRYLIC LATEX FLAT
- 8. ON HARDWOODS IPS 100 (Hardwood Paneling and Hardwood Trim) COLOR: MINWAX- TO BE DETERMINED BY ARCHITECT
 - a. FIRST TWO COATS: CLEAR GLOSS MINWAX POLYURETHANE
 - b. FINISH COAT: CLEAR SATIN MINWAX POLYURETHANE
- B. EXTERIOR PAINT SYSTEMS: COLUMBIA PAINT AND COATINGS
 - 1. ON CONCRETE BLOCK (EPS 10) COLOR: COLUMBIA- TO BE DETERMINED BY ARCHITECT
 - a. FIRST COAT: 01-0443 PROFESSIONAL HIGH BUILD INT/EXT LATEX BLOCK FILLER
 - b. FINISH COAT: 02-250 PREMIUM PRO ACRY-PLUS 09 99 00 4

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INTERIOR LATEX FLAT

2. ON STEEL (EPS 20) COLOR: COLUMBIA- TO BE DETERMINED BY ARCHITECT

- a. FIRST COAT: 05-2554 PROFESSIONAL METAL PRIMER
- b. FINISH COAT: 01-235 PREMIUM PRO EXTERIOR 100% ACRYLIC LATEX FLAT

PART 3 EXECUTION

3.01 INSPECTION

- A. Thoroughly examine surfaces scheduled to be painted prior to commencement of work. Report in writing to Owner, conditions that may potentially affect proper application. Do not commence until such defects have been properly corrected.
- B. Properly correct defects and deficiencies in surfaces which may adversely affect work of this Section.
- C. Beginning of installation means installer accepts existing substrates.

3.02 PROTECTION

- A. Adequately protect other surfaces from paint and damage. Repair damage resulting form inadequate, and unsuitable protection.
- B. Use sufficient drop cloths, shields, and protective equipment to prevent spray and droppings from fouling surfaces not being painted, surfaces within storage and preparation area.
- C. Place cotton waste, cloths, and material which may constitute fire hazards, in closed metal containers and remove daily from site.
- D. Prior to painting operations, remove electrical plates, surface hardware, fittings and fastenings. Carefully store, clean, and replace on completion of work in each area. Do not use solvent to clean hardware with permanent lacquer finish.

3.03 PREPARATION

- A. Remove mildew, by scrubbing with solutions of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry completely.
- B. Remove contamination from gypsum board surfaces and prime to show defects, if any. Paint after defects have been remedied.
- C. Remove surfaces contamination and oils from zinc coated surface and prepare for priming in accordance with metal manufacturer's recommendations.

- D. Remove dirt, loose mortar, scale, powder and other foreign matter from concrete and unit masonry surfaces to be painted. Remove oil and grease with solutions of tri-sodium phosphate; rinse well and allow to thoroughly dry.
- E. Remove grease, rust, scale, dirt, and dust from steel and iron surfaces. Where heavy coatings of scale are evident, remove by wire brushing, sandblasting, or other necessary method. Ensure steel surfaces are satisfactory before painting.
- F. Clean unprimed steel surfaces by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Prime surfaces to indicate defects. Paint after defects have been remedied.
- G. Sand and scrape shop primed steel surfaces to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- H. Galvanized Metals:
 - 1. Solvent clean with toluol, xylol, or lacquer thinner to remove oils, grease and other contaminants. Don not use paint thinner or turpentine.
 - 2. Use phosphoric acid based, etching type, surface treatment compatible with painting system materials. Follow surface treatment manufacturer's instructions.
 - 3. Where conditions require, use strong acid treatment or sand blasting to prepare galvanized surfaces scheduled to receive paint finish.
- I. Wipe off dust and grit from miscellaneous wood items and millwork prior to priming. Sand wood, scheduled to receive transparent finish, to unblemished condition. Visible sanding scratches are unacceptable. Spot-coat knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried, and sand between coats. Remove factory applied sealers containing wax from glue laminated members finished under this Section by solvent wiping and sanding before coating. Back prime interior and exterior woodwork.

3.04 APPLICATIONS

- A. Apply products in accordance with manufacturer's instructions.
- B. Apply each coat to uniform finish, at proper consistency.
- C. Tint each coat of paint slightly darker than preceding coat unless otherwise accepted by Owner's Representative.
- D. Sand lightly between coats to achieve required finish.
- E. Do not apply finishes on surfaces not sufficiently dry.
- F. Allow each coat of finish to dry before applying following coat, unless directed otherwise by manufacturer.
- G. Where clear finishes are required, tint fillers to match wood. Work fillers well into grain before set. Wipe excess from surfaces.
- H. Prime top and bottom edges of hollow metal doors with enamel undercoat.

- I. Prime back surfaces of interior and exterior woodwork with primer paint.
- J. Prime back surfaces of interior wood work scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.
- K. Colors:
 - 1. Anticipate maximum 3 field colors and 4 accent colors for paint and enamel systems.
 - 2. Anticipate maximum 3 field colors and no accent colors for epoxy paint systems. Refer to Section 09650 for gym floor striping.
 - 3. Anticipate maximum 1 field color and no accent colors for each of the other paint and stain systems.

3.05 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Remove grilles, covers, and access panels for mechanical and electrical systems for locations and paint separately.
- B. Finish paint primed equipment to color selected.
- C. Paint interior surfaces of air ducts, convector and baseboard heating cabinets visible through grilles and louvers with one coat flat black paint, to limit of sight line.
 - 1. Paint dampers exposed immediately behind louvers, grilles, convector and baseboard cabinets to match face panels.
- D. Paint both sides and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment.
- E. Paint electrical panel boards and frames. In locations other than electrical/mechanical rooms, paint color to match adjacent wall surfaces.

3.06 CLEANING

- A. As work proceeds and upon completion, promptly remove paint spills, splashes, and spatters.
- B. During progress of work keep premises free from unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Upon completion of work leave premises neat and clean.

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SECTION 10 35 00

FLAGPOLE

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Supply anchors and fittings for casting into concrete
 - 2. Metal flagpole, lanyards, pulleys, and fittings.
- B. Related Work Described Elsewhere:
 - 1. Cast-In-Place Concrete Section 033000
- C. References:
 - 1. American Society for Testing and Materials: ASTM:
 - a. A525-83 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
 - b. B221-83 Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
 - c. D1187-82 Asphalt-Based Emulsions for Use as Protective Coating for Metal

1.02 PERFORMANCE

A. Pole With Flag Flying: Resist, without permanent deformation, 90 miles/hr.

1.03 SUBMITTALS

- A. Submit shop drawings, installation instructions, and product data under provisions of Section 013400.
- B. Indicate dimensions of pole and anchor requirements, base details, all components, and sizes.

1.04 PROTECTION

A. Spiral wrap flagpole with protective covering and pack in shipping tubes.

PART 2 PRODUCTS

- 2.01 MANUFACTURER
 - A. Morgan-Francis, Flagpoles & Accessories
 - B. Approved Substitutions:
 - 1. Concord
 - 2. Superior Aluminum Products, Inc.

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2.02 MATERIALS

- A. Furnish a seamless aluminum cone tapered flagpole with all necessary fitting, as manufactured by Morgan-Francis Co. Pole shall be ground set, 35' ft. exposed, 39 1/2" ft. overall. The butt diameter shall be 7".
- B. Pole shall be machined to a satin brushed natural anodized aluminum finish.
- C. Internal Halyard System.
- D. Flush door with cylinder Lock and Key.
- E. Halyard: 1/8" Stainless Steel Aircraft Cable.

2.03 OTHER MATERIALS

- A. Provide all other materials, not specifically described, but required for a complete and proper installation of flag pole, as selected by the Contractor, and subject to the approval of the Owner's Representative.
- PART 3 EXECUTION

3.01 INSPECTION

A. Verify concrete foundation is correctly sized and positioned.

3.02 PREPARATION

A. Coat portions of flagpole below grade and in contract with dissimilar materials with bituminous paint.

3.03 INSTALLATION

- A. Install flag pole, base assembly, and fittings in accordance with manufacturer's instructions.
- B. Ground flagpole installations.
- C. Install foundation plate and centering wedges for flagpole base set in concrete base and fasten.
- D. Check and adjust installed fittings for smooth operation of lanyards.

SECTION 10 40 00

SIGNS AND SYMBOLS

- PART 1 GENERAL
- 1.01 SUMMARY
 - A. Interior non-illuminated directional surface mounted signage.
 - B. Building Signage
 - C. Cast Commemorative Plaque

1.02 REFERENCES

- A. Americans with Disabilities Act (ADA)
- B. American National Standards Institute (ANSI)

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide signage systems that conform to the following requirements of regulatory agencies and the quality control of InPro SignScape.
 - 1. Signage shall comply with all applicable provisions of the ADA and ANSI A117.1-1998

1.04 SUBMITTALS

- A. Product Data: Manufacturer's printed product data for each signage system indicated in this section.
- B. Signage Report: SignPro signage report indicating signage sizes, lettering and construction.
- C. Samples: Verification samples of signage systems minimum of 6 inches (152mm) square of each type and color indicated.
- D. Manufacturer's Installation Instructions: Printed Installation Instructions for each signage system.
- 1.05 DELIVERY, STORAGE AND HANDLING
 - A. Deliver materials in unopened factory packaging to the jobsite.
 - B. Inspect materials at delivery to assure that specified products have been received.
 - C. Store in original packaging in a climate controlled environment away from direct sunlight.

1.06 WARRANTY

A. Standard InPro SignScape limited lifetime warranty against material and manufacturing defects.

2.01 MANUFACTURERS

A.	Acceptable Manufacturer:	InPro SignScape,	
		InPro Corporation PO Box 406, Muskego, WI 53150	
		Telephone 800-222-5556, Fax: 888-715-8407	
		E-mail: service@inprocorp.com	

- B. Substitutions: Per section 016300
- C. Provide all signage systems from a single manufacturer.

2.02 INTERIOR SIGNS

- A. Interior signs: InPro Santa Cruz Collection (www.inprocorp.com)
 - 1. Interior grade photopolymer panels
 - 2. Color: Provide Premium Finishes in Chemetal and 3 form, Provide samples for selection
 - 3. Grade II Braille
 - 4. Sign Standoffs: Brushed Silver
 - 5. Square Corners
 - 6. Font: Helvetica
 - 7. Copy Height: 5/8" all caps
- B. Sign Type & Quantity:
 - 1. Room name: 20 maximum. Provide signage at all doors with copy to read per Architectural drawings room names. Signage text shall be proofed and approved by Architect prior to fabrication.
 - 2. Regulatory: 7- maximum
 - 3. ADA-Compliant Identification & Symbols: 1- At all restrooms per architectural drawings.
- C. Vinyl lettering: 3mm film at entry window, per architect drawings. Signage shall read as the following text copy. Signage text and material shall be proofed and approved by Architect prior to fabrication.

Nikiski Fire Station #3

Office Hours: Hours M-F: 8 am-12 pm 1 pm -5 pm

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2.04 BUILDING SIGNAGE

- A. Building Identification: Provide 12"x ³/₄" thick Black Aluminum Letters in Arial font stud mounted per manufacturer spec where shown in the drawings, the following signs shall be fabricated and installed.
 - 1. "Nikiski Fire Station #3"
- B. Acceptable manufacturer: Woodland Manufacturing @ woodlandmanufacturing.com.

2.05 BUILDING ADDRESS

- B. Building Identification: Provide 4"x 1/4" thick Black Aluminum Letters in Arial font stud mounted per manufacturer spec where shown in the drawings, Coordinate Address numbers and location with Architect.
- C. Acceptable manufacturer: Woodland Manufacturing @ woodlandmanufacturing.com.

2.06 CAST COMMEMORATIVE PLAQUE

- A. After producing approved shop drawing, fabricate and install commemorative plaque at the location indicated on plans.
- B. The plaque shall be cast from bronze, hand chased, finely polished, and chemically protected to produce a high quality product using the latest foundry technology and equipment.
- C. Size: Per Architectural drawings.
- D. Finish shall be finely polished with a smooth, dark oxidized "pebble" background texture and satin polished letters as manufactured by Metal Arts <u>www.metalarts.net</u> 800-237-8069, substitutions per Section 01030 Alternates.
- E. Fastening of cast bronze plaque shall be with concealed fasteners. Contractor shall provide solid backing at the height and location indicated on plans.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions in which the signage system will be installed.

1. Complete all finishing operations, including painting, before beginning installation of signage systems.

2. Wall surface shall be dry and free from dirt, grease and loose paint.

3.02 PREPARATION

A. General: Prior to installation, clean substrate to remove dust, debris and loose particles.

3.03 INSTALLATION

A. General: Locate the signage system as indicated on the approved detail drawing for the appropriate substrate and in compliance with the InPro SignScape installation instructions. Install signage systems level and plumb at the height indicated on the drawings.

3.04 CLEANING

A. At completion of the installation, clean surfaces in accordance with the InPro SignScape clean up and maintenance instructions.

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SECTION 10 52 20

FIRE FIGHTING DEVICES, CABINETS, AND ACCESSORIES

PART 1 GENERAL

1.01 DESCRIPTION

Α. Work Included:

> Location and types of fire fighting devices are shown in the Drawings. Included are fire extinguishers, cabinets and mounting accessories.

Β. Related Work Described Elsewhere:

1. Concrete Unit Masonry:	Section 042000
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- Section 092500 2. Gypsum Wallboard: 3. Painting:
 - Section 099000

- C. References:
 - 1. Aluminum Association (AA): Finish designations.
 - National Fire Protection Association (NFPA): 10 Portable Fire 2 Extinguishers.

QUALITY ASSURANCE 1.02

Conform to NFPA 10 requirements for extinguishers. Α.

1.03 SUBMITTALS

- Submit product date and installation instructions under provisions of Section 013400. A.
- Β. Include physical dimension, operational features, color and finish, wall mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.
- 1.04 **OPERATION AND MAINTENANCE DATA**
 - Α. Submit manufacturer's operation and maintenance data under provisions of Section 017300.
 - Β. Include test, refill or recharge schedules, procedures, and re-certification requirements.

1.05 ENVIRONMENTAL REQUIREMENTS

Do not install extinguishers when ambient temperatures may cause freezing. Α.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS
 - Larsen's Manufacturing Co. Α.

2.02 MATERIALS

Fire Extinguishers: Α.

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Dry Chemical Type: Steel tank, Larsen Model MP10 with pressure gage, 4A-60BC. UL listed and labeled.

B. Cabinets:

Surface Mounted type with vertical duo panel door and manufacturer's standard AA Architectural Class 1 anodized finish, color as selected. Larsen's 2409-SM with float glass.

C. Brackets:

Wall Mounted Brackets: Heavy gauge steel with white baked enamel finish, of same manufacturer as extinguisher. Larsen's model B-2.

- 2.03 OTHER MATERIALS
 - A. Provide all other materials, not specifically described, but required for a complete and proper installation of fire fighting devices, as selected by the Contractor, and subject to the approval of the Owner's Representative.
- PART 3 EXECUTION

3.01 INSPECTION

- A. Verify rough openings for cabinets are correctly sized and located.
- B. Beginning of installation means installer accepts existing conditions.

3.02 INSTALLATION

- A. Install cabinets and brackets plumb and level in wall openings as shown, or it not shown, at 54 in. from finished floor to top of extinguisher.
- B. Secure rigidly in place in accordance with manufacturer's instructions.
- C. Install extinguishers fully charged and operable.
- D. Wrap gypsum board behind recessed cabinet in one-hour walls.

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SECTION 10 80 00

TOILET AND BATH ACCESSORIES

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Provide toilet and bath accessories listed herein.
 - 2. Attachment Hardware.
 - B. Related Work Described Elsewhere:
 - 1. Miscellaneous Specialties Section 109250
 - C. REFERENCES
 - 1. American Society for Testing and Materials (ASTM):
 - a. A167-84 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - b. A366-72 (1979) Cold-Rolled Carbon Steel Sheets, Commercial Quality.

1.02 SUBMITTALS

- A. Submit manufacturers' product data and installation instructions under provisions of Section 013400.
- B. Data to illustrate each accessory at large scale and show installation method.
- 1.04 DELIVERY, STORAGE AND HANDLING
 - A. Do not deliver accessories to site until rooms in which they are to be installed area ready to receive them.
 - B. Pack accessories individually in a manner to protect accessory and its finish.

1.05 PROTECTION

A. Protect adjacent of adjoining finished surfaces and work from damage during installation of work of this Section.

PART 2 PRODUCTS

- 2.01 MANUFACTURER
 - A. American Specialties Inc.
 - B. Bobrick, Inc.
 - C. Substitutions: Per Section 016300.

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2.02 SCHEDULE OF ACCESSORIES

- A. 1-1/4" Dia. Grab Bar Series with Flanges for Concealed Mounting:
 - 1. American Specialties Model #3000
 - 2. Quantity: 1
 - 3. Grap Bar Configurations: Type 56
 - 4. Size: 36" x 54" x 47-3/4"
- B. Toilet Seat Cover Dispenser Recessed:
 - 1. American Specialties Model #6477
 - 2. Quantity: 3
- C. Recessed Toilet Paper Dispenser:
 - 1. American Specialties Model #0031
 - 2. Quantity: 2
- D. Recessed Toilet Paper Dispenser with Sanitary Disposal:
 - 1. American Specialties Model #04823
 - 2. Quantity: 1
- E. Recessed Automatic Roll Paper Towel Disp.(with AC Power):
 - 1. American Specialties Model #045224AC
 - 2. Quantity: 3
- F. Frameless Polished Plate Glass Mirror ¹/₄" Thick:
 - 1. American Specialties Model #8287 Quantity: 2 Size: 24" x 48"
 - 2. American Specialties Model #8287 Quantity: 2 Size: 34" x 48"
 - 3. American Specialties Model #8287 (At Exercise Room 211) Quantity: 4 Size: 48" x 72"

- G. Lavatory Mounted Soap Dispenser (with AC Adaptor)
 - 1. American Specialties Model #0335-S
 - 2. Quantity: 3
- H. Recessed Stainless Steel Baby Changing Station:
 - 1. American Specialties Model #9013
 - 2. Quantity: 1
- I. Mop and Broom Holder Rack
 - 1. American Specialties Model #8215
 - 2. Quantity: 2
- J. Towel Bar Round
 - 1. American Specialties Model #7307-24
 - 2. Quantity: 2
- K. Robe Hook
 - 1. American Specialties Model #7308
 - 2. Quantity: 9

PART 3 EXECUTION

- 3.01 PREPARATION
 - A. Deliver inserts and rough-in frames to jobsite at appropriate time for building-in. Provide templates and rough-in measurements as required.
 - B. Before starting work notify Owner's Representative in writing of any conflicts detrimental to installation or operation of units.
 - C. Verify with Owner's Representative exact locations of accessories.

3.02 INSTALLATION

- A. Install fixtures, accessories and items in accordance with manufacturer's instructions.
- B. Install true, plumb, and level, securely and rigidly anchored to metal studs or other solid backing.
- C. Use tamper-proof fasteners.
- D. Lock grab bars to concealed mounting plate installed in wall; anchor to withstand 200 lbs. downward pull.

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MISCELLANEOUS SPECIALTIES

- PART 1 GENERAL
- 1.01 DESCRIPTION
 - A. Work Included:
 - 1. Items scheduled under PART 2 Products.
 - B. Related Work Described Elsewhere:

1.	Acoustical Ceilings	Section 095110
2.	Hollow Metal Doors and Frames	Section 081110

1.02 SUBMITTALS

- A. Submit product data, samples, shop drawings and manufacturer's installation instructions under provisions of Section 013400.
- B. Provide above submittals on each item scheduled under Products.
- C. Indicate framing system, sizes and spacing of hangers, braces, and components, loads, bearing and anchor details of ceiling hooks. Submit design calculations signed by professional engineer experienced in structural framing design of metal components.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver products of this Section in individual packages, under provision of Section 016100.
- B. Protect products of this Section from damage or disfiguration, under provisions of Section 016200.
- C. Mask off products of this Section to protect from over spray or finishing of adjacent surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Listed under each scheduled item.

2.02 MATERIALS

A. CORNER GUARDS:

Equal to 1 1/2 " IPC Tape on Vinyl Cornerguards; 6ft. tall on all external corners of all gypsum board wall construction. Color as selected by architect.

PAGE 2 OF 3

B. 911 PHONE: (Lobby 101)

Provide "Rath Microtech" Model 2300-614RD. Dimensions 11 7/16" W x 13 9/16" H x 5 1/4" D, or equal. Substitutions per Section 01630.

C. KEY BOX:

Provide a Series 3200 recessed mounted, 7 x 7 inch flange and mounting accessories, dark bronze color, as manufactured by the Knox Company 17672 Armstrong Avenue Irvine, CA 92614-5728 (800) 552-5669. Authorization form for ordering will be furnished by Owner's Representative. Return form to Owner's Representative after filling-in for signature of Fire Chief. Contract shall furnish and install key box.

D. BUNKER GEAR WALL MOUNT LOCKERS: (Apparatus Area 111)

- 1. Approved Manufacturer: GearGrid, www.geargrid.com
- 2. Size: Apparatus Bay 111: 5 Jumbo Lockers- 20" W x 20" D x 74-1/2" H
- 3. Number of Lockers: Per architectural drawings
- 4. Shelves/Hooks: Two shelves constructed of high-strength ¹/₄" wire, and three apparel hooks per locker
- 5. Provide secure doors
- 6. Adjustability: Wire shelves adjustable in 3" increments.
- 7. Frame: Heavy-duty 1-1/4" tubing.
- 8. Side and Back Grids: High-strength ¹/₄" wire.
- 9. Name Plates: 20 GA. sheet metal, accepts 2" x 16" custom printed name plate. 2" x 12" nameplate on secure doors.
- 10. Mounting Brackets: 11 GA. steel
- 11. Finish: Durable powder coat.
- 12. Colors: Per architect.

E. STAINLESS STEEL BASE MOLDING: (Decon Room 109)

- 1. Approved Manufacturer: Diamond Life Gear, <u>www.diamondlifegear.com</u>
- 2. Material: 22 gauge Stainless Steel
- 3. Dimensions: 4 1/2" x 16 LF
- 3. Warranty: 90 days
- 4. Pre-formed corners: Provide at all corners shown on drawings.
- P. STAINLESS STEEL TABLE WITH INTREGAL SINKS: (Decon Room 109)
 - 1. Approved Manufacturer: Lambertson Industries, <u>www.lamertson.com</u>

1335 Alexandria Court

Sparks, NV 89434

- 2. Material: 16 gauge type 304 Stainless Steel
- 3. All one piece welded construction
- 4. Turned up backsplash
- 5. All joints seem welded and all visible welds ground smooth and polished to a #4 finish
- 6. Stainless Steel Legs, Feet, and Bracing
- 7. Tubs: One at (96" x 20" x 16"deep) and two at (21" x 21" x 16" deep)

R. HOUSE COMPRESSOR - 2-STAGE AIR COMPRESSOR: (Apparatus Area 111)

- 1. Provide Ingersoll Rand Model 2545 K10V 2-stage vertical air compressor at location shown in drawings
- S. FIRE POLE: (Commons 104)
 - 1. Approved Manufacturer: Mcintire Brass Works, Inc. 14 Horace Street Sommerville, MA 02143 www.slidepole.com
 - 2. Model: #23
 - 3. Description: The model 23 consists of a steel frame, chrome plated bronze rails and gate arms surrounding a polished brass pole that extends from floor to ceiling. The above floor unit has stainless steel guarding below the rails and gate arms and a bronze ring that rests on the floor. Two fire-resistant doors are mounted in the steel frame whish is suspended from the ceiling. There is an enclosed control unit mounted to the steel frame opposite the gates. This contains motor controllers and a small computer called a PLC. Two infrared sensors are mounted in the front of a small enclosure that is fastened to the stanchion across from the gates. The small enclosure also houses the on/off switch. The Model 23 is always powered. The sensors in the small enclosure project a beam of light across the opening to two reflectors on the gate guards. When either gate is opened or a person is on the pole and blocks the beam, the beam is interrupted and the PLC actuates motors that drop the doors to the open position. The doors remain in the open position as long as there is a person at floor level on the pole or as long as the gates are open. After the gates close and a person has slid below the floor level on the pole, the controller waits 20 seconds and closes the doors. If another person slides down the pole during this period the timer is reset and the doors will remain open or slide open in mid cycle if need be. A temperature sensor located on the bottom of the frame will disable the operation of the pole if the temperature below the floor exceeds 180 degrees F.
 - 4. Fire Rating: 1 hour
 - 5. Provide a complete operational system.
- T. Product Substitutions: Under provisions of Section 016300.

PART 3 EXECUTION

- 3.01 INSTALLATION
 - A. Install miscellaneous specialty items plumb and level, conforming with manufacturer's installation requirements, in accordance with reviewed shop drawings.

3.02 PROTECTION

A. Protect installed items in accordance with Section 015000.
SECTION 11 45 20

APPLIANCES

PAGE 1 OF 2

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Range
 - 2. Microwave
 - 3. Dishwasher
- B. Related Work Described Elsewhere:

1.	Modular Casework	Section 12 30 20
2.	Basic Plumbing Requirements	Section 22 00 00
3.	Ducts	Section 23 31 00

- 4. Wiring Devices Section 26 27 26
- C. References:
 - 1. Electrical Components: UL Listed and Labeled
 - 2. Install electrical equipment in conformance with UL requirements.

1.02 SUBMITTALS

- A. Submit product data under provisions of Section 01 34 00.
- B. Submit manufacturer's brochures, properly edited for Project, for each item of equipment required. Include catalog cuts and technical specifications.
- C. Show locations of electrical and mechanical connections, anchorage's, finishes, fitting, mounting flanges, studs and gaskets for installation.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver appliances to Project in manufacturer's original, unopened protective packaging with attachments and accessories necessary for complete installation. Do not deliver appliances until Project is ready for installation of units.
- 1.04 WARRANTY
 - A. Provide manufacturer's standard guarantee, under provisions of Section 01 74 00.

1.05 OPERATION AND MAINTENANCE DATA

- A. Provide manufacturer's standard operation / maintenance data under provisions of Section 01 73 00.
- PART 2 PRODUCTS
- 2.01 APPLIANCE LIST

A. Residential Appliances:

1.	Range: (CGS986SELSS)	GE Café Series 30" Free Standing Gas Range	
2.	Microwave: (CVM9215SLSS)	GE Cafe Series 2.1 Cu. Ft. Over the Range Microwave	
2	Dishuusahaw	OF Orfe Duilt in Diskusseh en	

- 3. Dishwasher: GE Cafe Built-in Dishwasher (CDT866P2MS1)
- A. Commercial Appliances:
 - 1. Extractor: UniMac UC Series Hardmount Washer- Extractor 30 LB (UC30 M9 Controls)
- C. Substitutions: Per substitutions Section 01 63 00.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that installation of equipment may be completed in accordance with requirements of Contract Documents and manufacturer's recommendations. Properly correct unsatisfactory conditions and proceed with installation.

3.02 INSTALLATION

- A. Install appliances plumb, level, in alignment and in accordance with manufacturer's recommendations.
- B. Mount dryer on wall using manufacturer's wall mount installation kit. Exhaust dryer out the left side.
- C. Connections to services specified in Divisions 22 and 23.

3.03 ADJUST AND CLEAN

- A. Testing: Test each item of residential equipment to verify proper operation. Make necessary adjustments. Demonstrate operation to Owner under provisions of Section 01 67 00.
- B. Accessories: Verify that accessory items required have been furnished.
- C. Cleaning: Remove packing material from residential appliances and leave units in clean condition, ready for operation.

END OF SECTION

PAGE 1 OF 8

SECTION 12 30 20 MODULAR CASEWORK

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Shop fabricated, plastic laminate covered wood casework with hardware.
 - 2. Prefinished surfaces.
 - 3. Countertops.
 - 4. Prepared for utilities.
 - 5. Casework installation.
- B. Related Work Described Elsewhere:
 - 1. Finish Carpentry Section 062000
 - 2. Door Hardware Section 087000
 - 3. Miscellaneous Specialties Section 109250
 - 4. Basic Plumbing Requirements Section 220000
 - 5. Plumbing Fixtures Section 224000
 - 6. Air Outlets and Inlets Section 233700
 - 7. O and M of Electrical Systems Section 260100
- C. References:
 - 1. American National Standards Institute (ANSI): A208.1-1979 Mat-Formed Wood Particleboard.
 - 2. Architectural Woodwork Institute (AWI): Quality Standards 1985 Edition.
 - 3. Commercial Standards (CS): 35 Adhesives.
 - 4. Federal Specifications (FS):
 - a. MM-L-736 Lumber, Hardwood.
 - b. MMM-A-130 Adhesive, Contact.
 - 5. National Electrical Manufacturer's Association (NEMA): LD3-1980 High Pressure Decorative Laminates.
 - 6. Voluntary Product Standard (PS):

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- a. 1 Construction and Industrial Plywood
- b. 20 American Softwood Lumber Standards
- c. 51 Hardwood and Decorative Plywood
- d. 58 Basic Hardboard.
- 7. American Society for Testing and Materials (ASTM): A525-83 Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip process.

1.02 QUALITY ASSURANCE

- A. Perform work to custom quality in accordance with "Quality Standards" of the Architectural Woodworking Institute (AWI).
 - 1. Laminate Clad Cabinets: AWI Section 1600.
 - 2. Laminate Clad Tops: AWI Section 1600, Division C.
- B. Furnish all modular casework by one manufacturer.
- C. Field measurements shall be taken prior to the completion of shop fabrication whenever possible. However, coordinate fabrication schedule with construction progress as directed by the Contractor to avoid delay of work. Field fabrication may be allowed to ensure proper fit. However, field fabrication shall be kept to an absolute minimum with the majority of the fabrication being done under controlled shop conditions.

1.03 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 013400.
- B. Include materials, components profiles, fastening methods, assembly methods, joint details, hardware, accessory listings, and schedule of finishes.
- C. Submit color samples under provisions of Section 013400.
- D. Submit samples 12 in. by 12 in. illustrating selected colors, patterns and finishes.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and protect wood materials under provisions of Section 016100 and 016200.
- B. Store indoors, in ventilated areas with constant minimum temperature of 60°F and maximum relative humidity of 55 percent.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. General: All cabinetry and casework illustrated in drawings shall meet AWI construction standards. Following products are for general reference only and are subject to compliance with specified requirements.
- B. Cabinet Manufacturer shall have a minimum of 10 years' experience in the manufacturing of this product.

C. Fabricator/Installer shall have a minimum 5 years' experience of metal panel work similar in scope and size to this project.

2.02 WOOD MATERIALS

- A. Softwood Lumber: PS 20 graded in accordance with AWI. Maximum moisture content 12 percent.
- B. Hardwood Lumber: FS MM-L-736 graded in accordance with AWI. Maximum moisture content 12 content.

2.03 SHEET MATERIALS

- A. Softwood Plywood: PS 1 graded in accordance with AWI, particleboard core.
- B. Wood Particleboard: ANSI A208.1 mat-formed, 3 ply board of balanced construction, minimum Grade 1-M-3; 3/4 in. core (plus overlay thickness); 8 percent maximum moisture content.
 - 1. 45 lb./cu. ft. density particleboard, and face screw holding minimum 300 lb. withdrawal, except for hinged cabinet doors use 50 lb. cu. ft. density or Grade 1-H-3 with face screw holding minimum 350 lb. withdrawal.
 - 2. Optional: Monolithic flakeboard, 3 ply board of balanced construction, outer layers of wood flakes. Provide 45 lb./cu ft density with face screw holding minimum 350 lb. withdrawal, surface hardness of 900 psi.
 - 3. Provide with resin binder, water-soluble glues and binders not acceptable; 8 percent maximum moisture content.
- C. Hardboard: PS 58 or CS 251; pressed wood fiber with resin binder; tempered grade, smooth on non-concealed surfaces. Prefinished, 1/4 in. thick minimum or as otherwise indicated, color matched to interior.
- D. Provide 3/4" Medex core material at all countertops with sinks

2.04 LAMINATE MANUFACTURERS

- A. Wilsonart Laminate
- B. ABET LAMINATI

2.05 LAMINATE MATERIALS

- A. Plastic Laminate: NEMA LD3, general purpose type, except post forming grade for curved countertops and where forming is required, colors shall be selected during submittal process. Provide premium grade laminate for selection.
 - 1. Horizontal and Vertical Exposed Surfaces: Premium Grade
 - 2. Horizontal and Vertical Non-Exposed Surfaces: General Purpose Grade

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K+A designstudios B. La

Laminate Backing Sheet: NEMA LD3 BK20 backing grade, undecorated plastic laminate.

2.06 ACCESSORIES

- A. Adhesives:
 - 1. Contact Adhesive: FS MMM-A-130, type recommended by accepted laminate manufacturer to suit application.
 - 2. Joint Adhesive: CS 35, Type 1 waterproof.
- B. Plastic Edge Trim: Heavy duty extruded 2 mm p.v.c., machine applied with waterproof hot-melt adhesive; 1/8 in. radius, all corners. Color as selected.
- C. Fasteners: Size and type to suit application.
- D. Trim, Fillers, Closures, Stands, Supports, Sleeves, Collars, Escutcheons, Ferrules, Brackets, Braces, and Other Miscellaneous Items: Manufacturer's standard of size and type to suit application, and consistent with casework design, except provide specified size and type where indicated.
- E. Vented Base: Modify casework construction and provide accessories as shown.
- F. Stainless Steel Panel: Provide 16ga type 304 stainless steel with No. 4 finish over ³/₄" plywood as shown in drawings.
- F. Galvanized Steel Sheet: ASTM A525, G60 zinc coating, gage of core steel shown.
 - 1. Adhesive for application of galvanized sheet to casework backs and bottom, and to gypsum wallboard: Similar and equal to 3M's Fast-Bond 30.

2.07 HARDWARE

- A. General: Comply with the requirements of ANSI/BHMA A156.9 and A156.11 and the following:
- B. Finish: US26D
 - 1. Concealed Hinges for flush doors. Three hinges required on doors over 48 in. tall.
 - 2. Drawer and door pulls:

a. Mocket DP224 – Continuous drawer and door pull or equal, located per architectural drawings

- 3. Cabinet Locks: 5 pun timbler type by CompX National (National Lock) with master key. Provide one lock per drawer or per door leaf where indicated on drawings. (All Airline Ticket Counters and Rental Car Counters)
 - a. Drawers: C8188, 2 keys per lock. Keyed per oweners requiements.
 - b. Doors: C8183, 2 keys per lock. Keyed per oweners requiements.
 - c. Strike: C2002, or as required for application
- 4. Catches: Heavy duty, magnetic, 7 lb. pull; BHMA B43172.

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5.	Drawer Slider: European style bottom mounted drawer slides, cold-rolled steel, zinc- plated, sized for minimum 75 lb. loads minimum (for drawers up to 6 in. high) and sized for 150 lb. loads and full extension (for drawers 6 in. high and over) load capacity side mount ball bearing rollers. Optional: BHMA B85062, sized as above. Manufacturer's standard baked enamel finish, off white color.

 Adjustable recessed shelf brackets: 16 gauge steel ANO Double-Slot Standard equal to Knapp and Vogt KV85 standard with KV185 support. Screw attach shelving to brackets typical.

2.08 FABRICATION

- A. Casework numbers referenced on Drawings refer to Westmark Series 200. Other approved manufacturers shall provide products of equivalent function, complying with Contract Documents.
- B. Construction: AWI flush or reveal overlay or flush inset (without face frame)
 - 1. Provide base cabinets with separate continuous or unit base raised off floor minimum 1/4 in. For unit cabinet construction, provide 1/8 in. thick hardboard continuous across adjacent cabinets, attached to toeboards. Provide special construction as detailed for continuous vented bases where indicated.
 - 2. Cabinet bottom, drawer fronts and doors; body member panels: 3/4 in. minimum thickness. 24 in. maximum width, 60 in. maximum height.
 - 3. Cabinet backs and drawer bottoms: Minimum 1/4 in. hardboard or optional minimum 1/2 in. particleboard.
 - 4. Drawer sides, backs and optional subfronts: 5-ply plywood. Particleboard not acceptable, except 3/4 in. front, subfront, and backs and 1/2 in. particleboard sides may be used in conjunction with European style bottom mount drawer slides.
- C. Field verify dimensions prior to fabrication.
- D. Assemble casework for delivery to site in units easily handled and permitting passage through building openings. Coordinate fabrication with built-in equipment dimension requirements.
- E. Fabricate adjustable shelves of 3/4 in. thick particleboard for spans up to 36 in., 1 in. thickness for spans up to 48 in. GP28 plastic laminate, polyester or melamine finish on top and bottom surfaces. Leading edge finished with .024 pvc to match interior color.
- F. Door and Drawer Fronts: GP28 plastic laminate cladding on front and back surfaces. Fit shelves, doors, and exposed edges with plastic edging. Use full length, wrap-around pieces only.
- G. When necessary to cut and fit on site, provide materials with amply allowance for cutting. Provide plastic laminate clad trim for scribing and site cutting.
- H. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline.
 - 1. Slightly bevel arises.

2. Locate counter butt joints minimum 24 in. from sink cutouts.

- 3. Cap exposed plastic laminate edges with plastic edge trim.
- I. Joinery and Fastening of case body members:
 - 1. Fixed case body members (shelves, bottoms, tops, and rails which are fastened to sides, ends and dividers) shall be joined using concealed dado or dowel along with screwed construction. Where concealed dado and dowel methods are employed, cases shall be assembled utilizing glue and pressure. Dado and dowel methods shall be reinforced with screwing. Screw methods shall utilize #6 x 2 in. deep threaded screws.
 - 2. Nails, screws or other fastenings shall not be visible on exposed surfaces. On semiexposed surfaces, mechanical fasteners may be visible, but they shall be color coordinated.
 - 3. Rails, spreaders or top panels shall be provided where case will have a separate top when required to conceal fastening of separate top.
- J. Counter tops: Manufacturer's standard butt splash tops, except rolled and coved splash tops on countertops where indicated. 4 in. splash unless otherwise noted or shown. Provide 3/4 in. radius rolled edge tops where indicated, and square edges tops where indicated.
 - 1. Nominal thickness 3/4 in., excluding rails.
 - 2. Use PF 42 plastic laminate for rolled edged and GP50 plastic laminate for square edged tops. Self edge exposed square edged countertop edges with GP 50 plastic laminate material of same finish and pattern.
 - 3. Tops shall have plastic laminate balancing sheet, minimum .020 in. thickness.
 - 4. Mechanically fasten splashbacks to countertops with screws at maximum 16 in. on center.
 - 5. Back splashes shall have back side laminated with a laminated backing sheet and bottom of splash shall be sealed with and set in a full bed of silicone sanitary sealant as specified in Section 079000.
 - 6. Where indicated provided back splashes with cove at connection to countertop and roll with scribe strip at junction with wall. Provide applied square edged splash returns at side walls coped to fit coved and rolled back splash and laminate finished ends.
 - 7. Edge banding on square edged tops shall be applied after face surfaces.
 - 8. Joints required for continuous runs or corners shall be shop prepared for bolt-type joint fasteners.
- K. Except as otherwise noted, apply laminate backing sheet to reverse side of plastic laminate finished surfaces. Apply in same machine direction in both faces.
 - 1. Interior exposed and semi-exposed surfaces, exterior tops of wall and tall cabinets, and exterior bottoms of wall cabinets: High pressure laminate liner, 60 percent polyester

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laminate or melamine laminated panels. Vinyl overlays not acceptable. Backs and drawer bottoms may be painted.

- 2. Exterior concealed surfaces: Balanced and sealed with phenolic overlay, (for polyester), or polymer treated kraft paper (for high pressure liner).
- 3. Interior concealed surfaces shall be finished with a balancing sheet.
- 4. Laminated components edges: Minimum 2mm thick extruded PVC, color throughout, bonded with waterproof hot melt adhesive; for doors, drawers and end panels. Subtops, bottoms and shelves shall be edged with .024 PVC.
- L. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.
- M. Unless otherwise indicated, mechanically fasten splashbacks to countertops with screws at maximum 16 in. o.c.
- N. All cabinets except sink bases to have full subtops, or optional 3/4 in. x 4 in. plywood spreaders front and back.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and openings are ready to receive work and field measurements are as shown on shop drawings. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical and building items are in place and ready to receive work of this Section.
- C. Beginning of installation means installer accepts conditions of existing substrates.

3.02 INSTALLATION

- A. Install work in accordance with AWI custom quality standards. Set and secure casework in place rigid, plumb and level.
- B. Use purpose-designed fixture attachments at concealed locations for wall mounted components.
- C. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units and countertops.
- D. Carefully scribe casework which is against other building materials, leaving gaps of 1/16 in. maximum. Do not use additional overlay trim for this purpose.
- E. Secure cabinet and counter bases to floor using appropriate angles and anchorages.
- F. Counter-sink anchorage devices at exposed locations used to wall-mount components, and conceal with solid plugs to match surrounding wood. Finish flush with surrounding surfaces.
- G. Secure cabinet to walls with screws at both top and bottom as required to prevent fillers and scribes from opening should settling or other substrate movement occur.

- H. Install continuous 1/8 in. thick hardboard kickboard cover on base of casework units built on unit principle, closely fitted to underside of casework bottoms and not more than 5/16 in. above substrate for floor covering.
 - 1. Located joints over solid backing.
 - 2. Set nails flush and leave ready to receive scheduled base specified in Division 9.
- I. Provide all trim, fillers, closures, stands, supports, sleeves, collars, escutcheons, ferrules, brackets, braces, and other miscellaneous items as indicated, and as required for complete installation.
- 3.03 ADJUSTING AND CLEANING
 - A. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.
 - B. Clean casework, counters, shelves, hardware, fittings and fixtures. Thoroughly vacuum clean interiors of drawers and cabinets. Clean, lubricate and adjust hardware.
 - C. Provide protection and maintain conditions in manner to ensure casework is without damage or deterioration at time of Substantial Completion.

3.4 TOLERANCES

- A. Variation from True Position: 1/16 in.
- B. Offset from True Alignment with Abutting Materials: 1/32 in.

END OF SECTION

PAGE 1 OF 4

SECTION 12 50 00 WINDOW BLINDS

PART 1 GENERAL

- 1.01 CONTRACT CONDITIONS
 - A. Work of this section is bound by the contract conditions and Division 1, bound herein, in addition to this specification and accompanying drawing.

1.02 EXTENT OF WORK

- A. Provide each blind as complete unit produced by one manufacturer, including all necessary hardware, mounting devices, accessory items, and fasteners.
- B. Provide Blinds at All Exterior and Interior Windows Except At Arctic Entries. Mounting: Inside of jambs.

1.03 REFERENCED SPECIFICATIONS

- A. Fabricate blinds in compliance with Commercial Item Description Document 1029 published by American Window Covering Manufacturers Association.
- B. Copies of documents can be obtained from Association at 355 Lexington Ave.; New York, NY 10017; (212) 661-5300.

1.04 COORDINATION

A. Coordinate with other trades affecting or affected by work of this section.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect against damage and discoloration.
- B. Deliver in manufacturer's original, unopened, undamaged packages with legible labels intact.
- C. Identify manufacturer, brand name, finish, color, and installation location on each package.

1.06 FIELD MEASUREMENTS

- A. Verify prior to fabrication.
- B. If field measurements differ slightly from drawing dimensions modify work as required for accurate fit. If measurements differ substantially, notify Architect prior to fabrication.

PART 2PRODUCTS

2.01 HORIZONTAL SLAT VENETIAN BLINDS

- A. Manufacturer & Model: Levolor Riviera, or approved. Similar units by Bali-Graber & Hunter-Douglas are approved.
- B. Typical Slats:
 - 1. Material: Spring tempered aluminum: Sheerview (perforated).
 - 2. Width: 1 inch.
 - 3. Finish: Manufacturer's standard.
 - 4. Color: Selected by Architect from manufacturer's standard choices.
- C. Head Rail:
 - 1. Material: Steel.
 - 2. Shape: Manufacturer's standard with sufficient front depth to conceal mechanism when viewed from standing eye level.
 - 3. Finish: Manufacturer's standard.
 - 4. Color: Match slat interior face.
 - 5. Required Accessories: Tilting mechanism, top brace, end braces, top cradle, and others required for complete installation.
- D. Bottom Rail:
 - 1. Material: Steel reinforced to prevent twist or sag.
 - 2. Weight: Sufficient to lower blind evenly and in alignment.
 - 3. Shape: Manufacturer's standard.
 - 4. End Caps: Manufacturer's standard metal or plastic.
 - 5. Finish & Color: Match slat interior faces.
- E. Tapes:
 - 1. Type: Braided ladder.
 - 2. Color: Match head rail.
- F. Tilter:
 - 1. Type: Manufacturer's standard, disengaging, enclosed, lubricated mechanism to provide full 180 degree operation, and hold blinds in any set angle.
 - 2. Operation: Wand-type, length to suit installation.

- G. Cords:
 - 1. Type: Manufacturer's standard; fit with self-aligning position equalizers and tassels secured to cord ends.
 - 2. Color: Match slat interior face.
 - 3. Minimum Breaking Strength: 200 lbs.
 - 4. Cords replaceable without removing tilter.
- H. Cord Locks:
 - 1. Type: Manufacturer's standard; automatically capable of holding blind in any vertical position.

2.02 FABRICATION

- A. Fabricate units to completely fill opening from jamb to jamb and head to sill.
- B. Align any intermediate unit ends with vertical window mullions or jambs.
- C. Space supporting tapes no less than 3 1/2 inches not more than 7 inches from slat ends, and no more than 36 inches apart between.
- D. Overlap slats when fully closed to exclude light.
- E. Locate controls for each operation. Notify Architect before fabrication if indicated locations can be improved.
- 2.03 FASTENERS
 - A. Oval-head, non-corrosive screws.

PART 3EXECUTION

3.01 EXISTING CONDITIONS

- A. Verify that work surfaces are accurately located and secure.
- B. Prior to starting work, notify general contractor about defects requiring correction.
- C. Do not start work until conditions are satisfactory.
- 3.02 PROTECTING WORK OF OTHER SECTIONS
 - A. Protect against damage and discoloration caused by work of this section.

3.03 INSTALLATION

A. Follow manufacturer's instructions.

- B. Do necessary cutting, tapping, and drilling.
- C. Protect metal parts in contact with dissimilar materials against galvanic corrosion.
- D. Securely attach units plumb, square, and true with brackets, clips, and fasteners.

3.04 ADJUSTMENTS

- A. Adjust units to provide correct clearances and overlaps.
- B. Adjust moving parts to operate satisfactorily at time of Project Substantial Completion and during Warranty Period.

3.05 PRODUCT CLEANING AND REPAIRING

- A. Including work of other trades, clean, repair and touch-up, or replace when directed, products which have been soiled, discolored, or damaged by work of this section.
- B. Remove debris from project site upon work completion, or sooner if directed.

END OF SECTION

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SECTION 22 00 00

BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes basic plumbing requirements, basic plumbing methods, restricted materials, seismic restraint, painting of mechanical systems, and plumbing systems testing.
- B. Related Sections:
 - 1. Division 1: All sections of Division 1 as they pertain to general contract requirements.
 - 2. Division 09 Painting: Painting of mechanical systems.

1.02 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Submittal Requirements: In addition to submittal procedures as outlined under Division 1, mechanical submittals shall be submitted as follows:
 - 1. Mechanical submittals shall be submitted complete and all at one time. Partial submittals will not be considered and will be returned without review. In some cases, the Owner's Representative may review partial submittals where early ordering of some equipment is essential to the project. Review of such partial submittals is at the discretion of the Owner's Representative. Any project delay due to the Contractor's failure to make complete submittals shall be the responsibility of the Contractor. Submittals shall be compiled in a notebook. The data shall be arranged and indexed by specification sections.
 - 2. Catalog sheets shall be complete, and the item or model proposed for use by the Contractor shall be clearly marked and identified as to which item in the specifications or on the drawings is being submitted.

1.03 CLOSEOUT SUBMITTALS

- A. Division 01 Contract closeout procedures.
- B. Contract Closeout Requirements: In addition to contract closeout requirements as outlined under Division 01, mechanical contract closeout requirements shall include the following:
 - 1. Record Documents:
 - a) Record Drawings.
 - b) Operation & Maintenance Manuals.
 - c) Valve Tag Schedule.
 - 2. Testing Reports.
 - 3. Equipment Startup Reports.
 - 4. Balancing Reports.

- 5. Systems Demonstrations.
- 6. Operation & Maintenance Instruction.

1.04 RECORD DOCUMENTS

- A. Record Drawings: In addition to record drawing requirements as outlined under Division 1, mechanical record drawings shall include the following:
 - 1. Any and all changes made in the field with respect to original design drawings.
 - 2. Actual valve locations and valve tag identification.
- B. Shop Drawings: Control system, fire protection, and other specialty system shop drawings shall be provided to the Owner. Record shop drawings shall be produced utilizing AutoCAD 2017 or more current release and provided on PDF digital format on a USB 3.0 or higher thumb drive.
- C. Operation & Maintenance Manuals: In addition to Operation & Maintenance Manual requirements as outlined under Division 01, mechanical O&M manuals shall include the following:
 - 1. Product data for each piece of equipment including local supplier and local manufacturer's representative including address, phone number, and fax number
 - 2. Manufacturers operation & maintenance instructions for each piece of equipment.
 - 3. Identification numbers for all parts and nearest source for obtaining parts.
 - 4. Verbal description of each system.
 - 5. Summary of maintenance instructions to Owner.
 - 6. Periodic maintenance form.
 - 7. Testing reports.
 - 8. Equipment startup reports.
 - 9. Final balance report.
 - 10. Valve schedule.
 - 11. Reduced scale record drawings.
 - 12. Reduced scale shop drawings.
- D. Valve Tag Schedule: The Contractor shall provide a framed valve tag schedule located in the boiler room.

1.05 OPERATION & MAINTENANCE INSTRUCTION

- A. Notification: The Contractor shall notify the Owner's Representative in a timely manner to schedule O&M instruction such that facility personnel may be present for such instruction.
- B. Instruction: The Contractor shall provide detailed instruction on the operation and maintenance requirements for all mechanical systems. Instruction shall include class time with maintenance

personnel and thorough on-site observations and review of each mechanical system and applicable equipment.

1.06 SUBSTITUTIONS

- A. Division 01 Product Options and Substitutions.
- B. Substitution Requirements: In addition to substitution requirements as outlined under Division
 1, mechanical material and equipment substitutions shall meet the following minimum requirements:
 - 1. Size: Proposed substitutions shall be of equivalent size and fit within available space with adequate service access as recommended by the equipment manufacturer.
 - 2. Performance: Proposed substitutions shall have equal or superior performance to specified equipment.
 - 3. Quality: Proposed substitutions shall be of equal or greater quality to specified equipment.
 - 4. Weight: Proposed substitutions shall be of equal weight to specified equipment or Contractor shall be responsible for modifications to structure as required for increased weight.
 - 5. Accessories and Options: Proposed substitutions shall be provided with appropriate accessories and options as required for a complete and operational system.
 - 6. System Modifications: The Contractor shall be responsible for modifications to mechanical systems, electrical systems, and building structure and finishes as required for implementing proposed substitute products.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable local codes and amendments including but not limited to the following.
 - 1. International Building Code (IBC) 2012 Edition
 - 2. Uniform Plumbing Code (UPC) 2012 Edition
 - 3. International Mechanical Code (IMC) 2012 Edition
 - 4. International Fire Code (IFC) 2012 Edition
 - 5. National Electric Code 2014 Edition
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered, stored, and handled at the project site to prevent damage and facilitate inspection.
- B. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering.

1.09 RESTRICTED MATERIALS

- A. Materials containing asbestos in any form are not allowed. Where materials or equipment provided by the Contractor are found to contain asbestos, such items shall be removed and replaced with non-asbestos items at no additional cost to the Owner.
- B. Materials containing lead are not allowed, unless specifically called out for in these specifications. Where materials or equipment provided by the Contractor are found to contain lead, such items shall be removed and replaced with lead free materials at no additional cost to the Owner.

1.10 BASIC MECHANICAL METHODS

- A. Installation Instructions: Comply with manufacturer's published instructions for delivery, storage, protection, installation, and materials.
- B. Operation of Equipment during Construction: When equipment is operable, and it is to the advantage of the Contractor to operate the equipment during construction, such equipment may be operated provided that the operation is properly supervised, and the Contractor retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install new filter media, make all required adjustments, and complete all punch list items before final acceptance by the Owner's Representative.
- C. Service Access: Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- D. Access Doors: Where mechanical equipment requiring access (including valves) is located above GWB ceilings, within wall assemblies, or other non-readily accessible locations; access doors shall be provided. Access doors within areas of public occupancy shall be lockable type.
- E. Mounting Heights: Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.
- F. Exposed Systems: Items exposed (in areas without ceilings) shall be installed in a neat, orderly manner. Elements shall be perpendicular and parallel to building lines. Items exposed in normally occupied areas (not including mechanical rooms) shall be finished in accordance with specifications. In those conditions where ductwork is exposed in finished areas, careful craftsmanship and only the highest standards of installation will be acceptable. All routing of exposed ducts, pipes, conduits, shall be approved in advance by the Owner's Representative prior to installation.
- G. Drawings and Specifications:
 - 1. The Drawings indicate the general arrangement of systems and are to be followed insofar as possible. If substantial deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Owner's Representative, for approval before proceeding with the work.
 - 2. This Contractor shall make all measurements in the field and shall be responsible for correct fitting. Contractor shall coordinate this work with all other trades in such a manner as to cause a minimum of conflict or delay.

- 3. Where any work is placed as to cause or contribute to a conflict it shall be readjusted at the expense of the Contractor. The Owner's Representative's decision shall be final regarding the arrangement of ducts, piping, etc, where conflict arises.
- 4. Where offsets in systems are required to complete the installation, or for the proper operation of the system, these shall be deemed to be included in the Contract.
- 5. Significant deviations from drawings must be approved by the Owner's Representative.
- H. Location of Mechanical Systems:
 - 1. Mechanical layouts indicated on drawings are diagrammatical. Exact locations of ducts, pipes, and equipment may vary because of conflicts with work of other trades.
 - 2. Locate equipment requiring periodic servicing so that it is readily accessible. Do not back up service sides to walls, nor place it too close to other equipment to make service impractical.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials and equipment shall be new, unused, and delivered to site in manufacturer's original packaging.
- B. Equipment shall be regularly cataloged items of the manufacturer and shall be supplied as a complete unit in accordance with the manufacturer's standard specifications. Optional items shall be provided as required for proper installation unless noted otherwise. Manufacturer's identification shall be maintained for all equipment.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Owner's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.02 INSTALLATION – GENERAL

- A. Install in accordance with manufacturer's instructions.
- 3.03 SEISMIC RESTRAINT OF PLUMBING EQUIPMENT
 - A. Seismically restrain equipment in accordance with the International Building Code. Seismic restraint assemblies shall be premanufactured, or field fabricated, secured to building structural components.

3.04 SEISMIC RESTRAINT OF PIPING SYSTEMS

- A. Seismically restrain all piping systems in accordance with the SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
- B. Seismic restraint shall be in accordance with Seismic Hazard Level (SHL) A of the SMACNA Seismic Restraint Manual.
- C. General Requirements for Piping:
 - 1. Bracing details, schedules, and notes of SMACNA manual apply to all types of pipe, conduit and all types of joints. Exception: Piping suspended by individual hangers 12 inches or less in length, as measured from the top of the pipe to the bottom of the support where the hanger is attached, need not be braced.
 - 2. Brace all fuel oil piping, gas piping and compressed air piping that is 1-inch nominal diameter or larger.
 - 3. Brace all piping located in boiler room, mechanical equipment rooms, and refrigeration mechanical rooms that is 1-1/4 inches nominal diameter and larger.
 - 4. Brace all pipes 2-1/2 inch minimal diameter and larger.
 - 5. Transverse bracing shall be at 40 feet maximum except where a lesser spacing is indicated in the tables for bracing of pipes.
 - 6. Longitudinal bracing shall be at 80 feet maximum except where a lesser spacing is indicated in the tables of SMACNA manual. In pipes where thermal expansion is a consideration, an anchor point may be used as the specified longitudinal brace provided that it has a capacity equal to or greater than a longitudinal brace. The longitudinal braces and connections must be capable of resisting the additional force induced by expansion and contraction.
 - 7. For all gas piping, the bracing details, schedules and notes of SMACNA manual may be used, except that transverse bracing shall be at 20 feet maximum, and longitudinal bracing shall be 40 feet maximum
 - 8. Transverse bracing for one pipe section may also act as longitudinal bracing for a pipe section of the same size connected perpendicular to it if the bracing is installed within 24 inches of the elbow or tee.
 - 9. Seismic braces for pipes on trapeze hangers may be used.
 - 10. Provide flexibility in joints where pipes pass through building seismic joints or expansion joints where rigidly supported pipes connect to equipment with vibration isolators. For threaded piping, the flexibility may be provided by the installation of swing joints. For piping with manufactured ball joints, select the length of piping offset using seismic drift in place of the expansion given in the joint manufacturer's selection table. Seismic drift = 0.015 feet per foot of height above the base where seismic separation occurs.
 - 11. Branch lines may not be used to brace main lines.
 - 12. A rigid piping system shall not be braced to dissimilar parts of the building or to two dissimilar building systems that may respond differently during an earthquake.

- 13. Cast iron pipe of all types, glass pipe, and any other pipe joined with a shield and clamp assembly, where the top of the pipe is 12 inches or more from the supporting structure, shall be braced on each side of a change in direction of 90° or more. Riser joints shall be braced or stabilized between floors.
- 14. Vertical risers shall be laterally supported with a riser clamp at each floor. For buildings greater than six stories high, all risers shall be engineered individually.
- 15. Restrain risers in hubless piping systems where the riser joints are unsupported between floors.

3.05 PAINTING

- A. Coordinate with Division 09.
- B. Paint all piping, hangers, and associated appurtenances exposed within finished spaces (except chrome plated or stainless steel). Insulated piping, ductwork, and equipment shall also apply.
- C. Paint all piping, hangers, and associated appurtenances exposed on the outside of the building. Paint roof mounted piping, ductwork, and associated appurtenances where visible from the ground level.
- D. Paint mechanical equipment delivered to the site with prime coat.
- E. Paint access doors to match adjacent wall or ceiling color; or as directed by the Owner's Representative.
- F. Paint piping and appurtenances exposed within casework; except chrome plated or stainless steel.
- G. Paint fabricated support systems, other than galvanized.
- H. Paint or touch-up, as directed by Owner's Representative, factory painted equipment damaged during shipment or installation.
- I. Colors as directed by Owner's Representative.

3.06 TESTING

- A. Testing Requirements: The Contractor shall test systems as specified herein and as required by local code, and local authority having jurisdiction. The Contractor shall be responsible for all materials, equipment, and costs associated with testing. The Contractor shall notify the Owner's Representative with respect to testing schedules in a timely manner such that personnel may be on site to witness testing if so desired by the Owner's Representative. Scheduling of testing with the local authority having jurisdiction shall be the responsibility of the Contractor. The Contractor shall submit testing reports to the Owner's Representative.
- B. Test all domestic water, heating water, glycol heating water and other similar pressure piping systems hydrostatically at 100 PSI or 150 percent of working pressure, whichever is greater, for a period of 4 hours. Observe piping during this period and repair all leaks.
- C. Building Drains, Vents Water Test: Cap all openings, fill pipe to the highest opening, and observe for no drop-in water level for 1 hour. Repair all leaks. If freezing could occur in pipes to be tested, provide air test by forcing air into the system to 5 PSI. The pressure must remain for 1 hour without dropping. The gauge must be 0-15 PSI maximum, for high resolution.

D. Building Sewer: Plug the end of the building sewer at its point of connection and fill the system with water from the lowest to the highest point and observe for no leaks over one hour. A 5 PSI air test for 1 hour is an acceptable alternate if freezing could occur.

3.07 SYSTEMS ADJUSTMENT

A. Systems shall be adjusted as necessary to ensure proper function of all controls, proper air distribution and elimination of drafts, noise and vibration. All systems shall be fully adjusted and in operating condition at final completion.

3.08 SYSTEMS DEMONSTRATION

- A. Notification: The Contractor shall notify and schedule demonstration of systems with the Owner's Representative such that appropriate personnel may be on site for demonstrations.
- B. Demonstration Personnel: The Contractor shall provide qualified personnel and materials on site as required to demonstrate systems.
- C. Demonstration: The Contractor shall demonstrate operation of all mechanical systems to the satisfaction of the Owner's Representative.

END OF SECTION

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SECTION 22 05 29

HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes piping, ductwork and equipment supports, hangers, anchors, bases sleeves and the sealing of work to adjacent construction.
- B. Related Sections:
 - 1. Division 3 Cast-In-Place Concrete: Execution requirements for placement of concrete housekeeping pads specified by this section.
 - 2. Section 22 07 00 Plumbing Insulation: Interface between insulation and support systems.
 - 3. Section 22 11 00 Domestic Water Piping: Support of domestic water piping systems.
 - 4. Section 22 13 00 Sanitary Waste and Vent Piping: Support of sanitary and vent piping systems.

1.02 REFERENCES

- A. ASME B31.1 (American Society of Mechanical Engineers) Power Piping
- B. ASME B31.9 (American Society of Mechanical Engineers) Building Services Piping
- C. ASTM F708 Design and Installation of Rigid Pipe Hangers.
- D. MSS SP58 (Manufacturers Standardization Society of the Valve and Fittings Industry) Pipe Hangers and Supports Materials, Design and Manufacturer.
- E. MSS SP69 (Manufacturers Standardization Society of the Valve and Fittings Industry) Pipe Hangers and Supports Selection and Application.
- F. MSS SP89 (Manufacturers Standardization Society of the Valve and Fittings Industry) Pipe Hangers and Supports Fabrication and Installation Practices.

1.03 SUBMITTALS

- A. Division 1 Shop drawings, product data and samples.
- B. Product Data: Submit manufacturers catalog data including load capacity.
- C. Manufacturer's Installation Instructions: Submit special procedures and assembly of components.

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.
- 1.05 FIELD MEASUREMENTS
 - A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

- 2.01 PIPE HANGERS AND SUPPORTS
 - A. Manufacturers:
 - 1. Grinnell.
 - 2. Michigan Hanger Co.
 - 3. Unistrut.
 - 4. Approved Equal.
 - B. Plumbing Piping DWV:
 - 1. Conform to MSS SP58.
 - 2. Hangers for Pipe Sizes ½ to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
 - 6. Vertical Support: Steel riser clamp.
 - 7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 8. Copper Pipe Support: Copper-plated, carbon-steel adjustable, ring.
 - C. Plumbing Piping Water, Fuel, Gas, Compressed Air:
 - 1. Conform to MSS SP58.
 - 2. Hangers for Pipe Sizes ½ to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Cold Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
 - 4. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
 - 5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 6. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.

- 7. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- 8. Floor Support for Hot Pipe Sizes to 4 inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- 9. Copper Pipe Support: Copper-plated, Carbon-steel ring.

2.02 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.03 INSERTS

A. 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 FLASHING

- A. Metal Flashing: 26 gauge thick galvanized steel.
- B. Metal Counterflashing: 22 gauge thick galvanized steel.
- C. Lead Flashing:
 - 1. Waterproofing: 5 lb./sq. ft sheet lead
 - 2. Soundproofing: 1 lb./sq. ft sheet lead.
- D. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.
- E. Caps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

2.05 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gauge thick galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gauge thick galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- D. Sleeves for Round Ductwork: Galvanized steel.
- E. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- F. Fire-stopping Insulation: Glass fiber type, non-combustible.
- G. Sealant: Acrylic.

2.06 PIPE ALIGNMENT GUIDES

A. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel.

PART 3 EXECUTION

- 3.01 INSTALLATION GENERAL
 - A. Install materials in accordance with manufacturer's instructions.

3.02 PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with MSS SP89.
- B. Support pipe hangers from building structural components.
- C. Support horizontal piping as scheduled.
- D. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.
- E. Place hangers within 12 inches of each horizontal elbow.
- F. Use hangers with 1-1/2 inch minimum vertical adjustment.
- G. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- H. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- I. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- J. Support riser piping independently of connected horizontal piping.
- K. Provide copper plated hangers and supports for non-insulated copper piping.
- L. Design hangers for pipe movement without disengagement of supported pipe.
- M. Prime coat exposed steel hangers and supports. Hangers and supports located in pipe shafts, and suspended ceiling spaces are not considered exposed.

3.03 DUCTWORK HANGERS AND SUPPORTS

A. Support ductwork systems in accordance with SMACNA requirements.

3.04 EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 4" thick and extending 4 inches beyond supported equipment. Refer to Division 1.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members or steel pipe and fittings. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.05 FLASHING

- A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash, and seal.
- C. Seal floor drains watertight to adjacent materials.
- D. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms for sound control.
- E. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.06 SLEEVES

- A. Set sleeves in position in forms. Provide reinforcing around sleeves.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Extend sleeves through floors one inch above finished floor level. Caulk sleeves.
- D. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- E. Install chrome plated steel escutcheons at finished surfaces.

3.07 EXPANSION LOOPS AND ANCHORS

- A. Provide expansion loops as indicated on drawings.
- B. Rigidly anchor pipe to building structure where necessary. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- C. Provide support and equipment required for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where indicated.

3.08 SCHEDULES

PIPE SIZE	MAX. HANGER SPACING	DIAMETER
Inches	Feet	Inches
½ to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8

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K+A designstudios

2-1/2 to 3	10	5/8
4 to 6	10	5/8
C.I. Bell and Spigot	5.0 and at Joints	5/8
C.I. No-Hub	5.0 and at Joints	5/8

END OF SECTION

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PLUMBING IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes nameplates, tags, stencils and pipe markers.
- B. Related Sections:
 - 1. Division 9 Painting.

1.02 REFERENCES

A. ASME A13.1 (American Society of Mechanical Engineers) - Scheme for the Identification of Piping Systems.

1.03 SUBMITTALS

- A. Division 1 Administrative Requirements: Product Data and Samples.
- B. Product Data: Provide manufacturers catalog literature for each product required.
- C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.04 CLOSEOUT SUBMITTALS

- A. Division 1 Contract Close-Out Procedures.
- B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.06 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS
 - A. Manufacturers:
 - 1. Craftmark Identification Systems.
 - 2. Safety Sign Co.
 - 3. Seton Identification Products.

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4. Approved Equal.

2.02 NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.03 TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inches diameter with smooth edges.
- C. Tag Chart: Typewritten letter size list of applied tags and location in anodized aluminum frame.

2.04 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. Piping: 3/4 inches high letters.
- B. Stencil Paint: A s specified in Division 9, semi-gloss enamel, colors and lettering size conforming to ASME A13.1.

2.05 PIPE MARKERS

- A. Color and Lettering: Conform to ASME A13.1.
- B. 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.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Division 9 for stencil painting.

3.02 INSTALLATION

- A. Apply stencil painting in accordance with Division 9.
- B. Install identifying devices after completion of coverings and painting.
- C. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- D. Install tags using corrosion resistant chain. Number tags consecutively by location.
- E. Identify air handling units, pumps and tanks with plastic nameplates. Small devices, such as inline pumps, may be identified with tags.

- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.
- H. Tag automatic controls, instruments, and relays. Key to control schematic.
- I. Identify piping located in the boiler room and fan rooms/areas with plastic pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at side of penetration of structure or enclosure, and at each obstruction.
- J. Identify piping, concealed or exposed, with plastic pipe markers or stenciled painting. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

PLUMBING INSULATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes insulation jackets, equipment insulation, covering, thermal insulation for piping systems including vapor retarders, jackets and accessories.
- B. Related Sections:
 - 1. Division 09 Painting: Execution requirements for painting insulation jackets and covering specified by this section.
 - 2. Section 22 05 29 Hangers and Supports: Execution requirements for inserts for placement by this section.
 - 3. Section 22 05 53 Plumbing Identification: Product requirements for plumbing identification for placement by this section.

1.02 REFERENCES

- A. ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus.
- C. ASTM C195 Standard Specification for Mineral Fiber Thermal Insulating Cement.
- D. ASTM C449/C449M Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
- E. ASTM C518 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- F. ASTM C534 Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- G. ASTM C547 Standard Specification for Mineral Fiber Preformed Pipe Insulation.
- H. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- I. ASTM C592 Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type).
- J. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- K. ASTM C1071 Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
- L. ASTM C1126- Standard Specification for Preformed Closed Cell Phenolic Foam Pipe and Board Insulation.

- M. ASTM C1136 Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
- N. ASTM D1784 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- O. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- P. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
- Q. ASTM E162 Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
- R. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- S. NAIMA (North American Insulation Manufacturers Association) National Insulation Standards.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Provide product description, thermal characteristics and list of materials and thickness for each service, and locations.
- C. Manufacturer's Installation Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not install insulation outside ambient conditions required by manufacturer of each product.
- B. Maintain temperature during and after installation for minimum period of 24 hours.
- 1.07 FIELD MEASUREMENTS
 - A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:
 - 1. Owens Corning.
 - 2. Certain Teed.
 - 3. Knauf.
 - 4. Armstrong.
 - 5. Johns Manville.
 - 6. Approved Equal.

2.02 MINERAL FIBER PIPE INSULATION

- A. Insulation: ASTM C547 Mineral Fiber Pipe Insulation, Type I 850(454).
- B. Vapor Retarder Jacket:
 - 1. White Kraft paper with glass fiber yarn, bonded to aluminized film.
 - 2. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.
- C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- D. Vapor Retarder Lap Adhesive: Compatible with insulation.
- E. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- F. Insulating Cement: ASTM C449/C449M.
- 2.03 ELASTOMERIC CELLULAR FOAM PIPE INSULATION
 - A. Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular form: ASTM C534; Type I, Tubular form.
 - B. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.04 INSULATION JACKETS

- A. Pipe Fitting Jacket: ASTM D1784, One piece molded type fitting covers, off-white color.
 - 1. Connections: Pressure sensitive color matching vinyl tape.
- B. Canvas Jacket: UL listed.
 - 1. Fabric: 6 oz/sq. yd., plain weave cotton.
- 2. Fire retardant lagging adhesive. Composite of insulation, jacket and lagging adhesive shall have a flame spread index not greater than 25 and a smoke developed index not greater than 50 per ASTM E84.
- 3. Lagging Adhesive: Compatible with insulation.
- C. Stainless Steel Jacket: ASTM A167 Type 302 stainless steel.
 - 1. Thickness: 0.016 inch thick.
 - 2. Finish: Corrugated.
 - 3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Division 01 Administrative Requirements: Coordination and project conditions.
- B. Verify that piping, equipment and ductwork has been tested before applying insulation materials.
- C. Verify that surfaces are clean and dry, with foreign material removed.
- 3.02 INSTALLATION GENERAL
 - A. Install in accordance with NAIMA National Insulation Standards.
- 3.03 INSTALLATION PIPING
 - A. Exposed Piping: Locate insulation and cover seams in least visible locations.
 - B. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, and strainers.
 - C. Mineral fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal all staple penetrations with vapor retarder mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with PVC fitting covers.
 - D. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
 - E. Mineral fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or the pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.

- 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with PVC fitting covers.
- F. Inserts and Shields:
 - 1. Application: Piping or Equipment 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert material: Compression resistant insulating material suitable for the planned temperature range and service.
- G. Continue insulation through penetrations of building assemblies or portions of assemblies having a fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions. Division 7 for penetrations of assemblies with a fire resistance rating greater than one hour.
- H. Pipe exposed in mechanical equipment rooms and vehicle bays 12' from floor: Finish with canvas jacket.

3.04 PIPING INSULATION SCHEDULE

Β.

A. Glass Fiber Insulation Schedule:

Piping Systems	Pipe Size	Thickness
Domestic Hot Water Supply	All	1"
Domestic Hot Water Recirculating	All	1"
Domestic Cold Water	All	1"
Cellular Foam Insulation Schedule		
Piping Systems	Pipe Size	Thickness
Buried Domestic Cold Water	All	1/2"
Vent Through Roof Assemblies	All	1"

SECTION 22 11 00

DOMESTIC WATER PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes domestic water piping, valves, fittings and accessories.
- B. Related Sections:
 - 1. Section 22 05 29 Hangers and Supports.
 - 2. Section 22 07 00 Plumbing Insulation.

1.02 REFERENCES

- A. ASME B16.18 (American Society of Mechanical Engineers) Cast Copper Alloy Solder Joint Pressure Fittings.
- B. ASME B16.22 (American Society of Mechanical Engineers) Wrought Copper and Bronze Solder Joint Pressure Fittings.
- C. ASME B16.26 (American Society of Mechanical Engineers) Cast Bronze Fittings for Flared Copper Tubes.
- D. ASME B31.9 (American Society of Mechanical Engineers) Building Service Piping.
- E. ASTM B32 Solder Metal.
- F. ASTM B88 Seamless Copper Water Tube.
- G. AWWA C651 (American Water Works Association) Disinfecting Water Mains.
- H. MSS SP-71 (Manufacturers Standardization Society of the Valve and Fittings Industry) Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- I. MSS SP-80 (Manufacturers Standardization Society of the Valve and Fittings Industry) Bronze Gate, Globe, Angle and Check Valves.
- J. MSS SP-110 (Manufacturers Standardization Society of the Valve and Fittings Industry) Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- K. ASME A1126.1 (American Society of Mechanical Engineers) Water Hammer Arrestors.
- L. ASSE 1011 (American Society of Sanitary Engineering) Hose Connection Vacuum Breakers.
- M. ASSE 1013 (American Society of Sanitary Engineering) Backflow Preventers, Reduced Pressure Principle.
- N. ASSE 1019 (American Society of Sanitary Engineering) Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
- O. AWWA C506 (American Water Works Association) Backflow Prevention Devices Reduced Pressure Principle and Double Check Valve Types.

P. PDI WH-201 (Plumbing and Drainage Institute) - Water Hammer Arrestors.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and supplies.
- B. Product Data:
 - 1. Submit data on pipe materials; pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 Contract closeout procedures.
- B. Project Record Documents: Record actual locations of valves and equipment.
- C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- 1.06 DELIVERY, STORAGE, AND HANDLING
 - A. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.
 - B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
 - C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work and isolating parts of completed system.

1.07 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.08 WARRANTY

A. Division 01 – Warranties and Bonds.

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PART 2 PRODUCTS

- 2.01 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
 - A. Copper Tubing: ASTM B88, Type K annealed.
 - 1. Fittings: ASME B16.18, cast bronze or ASTM B16.22 wrought copper and bronze.
 - 2. Joints: AWS A5.8, BCuP silver braze.
 - B. Ductile Iron Pipe: AWWA C151.
 - 1. Fittings: AWWA C110, ductile or gray iron, standard thickness.
 - 2. Joints: AWWA C111, rubber gasket with ³/₄ inch diameter rods.

2.02 WATER PIPING, ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, solder, Grade 95TA lead free.

2.03 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 inches and Under:
 - 1. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Pipe Size Over 2 inch:
 - 1. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.04 BALL VALVES

- A. Manufacturers:
 - 1. Crane.
 - 2. Hammond.
 - 3. Nibco.
 - 4. Approved Equal.
- B. Construction, 4 inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder or threaded ends.
- 2.05 SWING CHECK VALVES
 - A. Manufacturers:

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- 1. Crane.
- 2. Hammond.
- 3. Nibco.
- 4. Approved Equal.
- B. Up to and Including 3 inches: MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder or threaded ends.

2.06 BACKFLOW PREVENTERS

- A. Manufacturers:
 - 1. Watts.
 - 2. Febco.
 - 3. Hersey.
 - 4. Approved Equal.
- B. Reduced Pressure Backflow Preventers: ANSI/ASSE 1013.
 - 1. Bronze body, with bronze internal parts and stainless steel springs.
 - 2. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, brass strainer, and four test cocks.

2.07 WATER HAMMER ARRESTORS

- A. Manufacturers:
 - 1. J.R. Smith.
 - 2. Josam.
 - 3. Zurn.
 - 4. Approved Equal.
- B. ANSI A1126.1; stainless steel construction, bellows type sized in accordance with PDI WH-201.
- C. Pre-charged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psi working pressure.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Verify that excavations are to required grade, dry and not over-excavate.
- 3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.

3.03 CERTIFICATION

A. Provide Owner with copy of reduced pressure backflow preventer certification.

3.04 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- C. Install piping to maintain headroom and neither interfere with use of space nor take more space than necessary.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not expose Coordinate size and location of access doors with Division 08.
- H. Establish elevations of buried piping outside the building to ensure not less than 10 ft of cover.
- I. Do not install underground piping when bedding is wet or frozen.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Division 09.
- L. Excavate and backfill in accordance with Division 31.
- M. Install valves with stems upright or horizontal, not inverted.
- N. Install water piping to ASME B31.9.
- O. Install potable water protection devices on plumbing lines where contamination of domestic water may occur.
- P. Pipe relief from valves, back-flow preventers and drains to nearest floor drain.
- Q. Install water hammer arrestors complete with accessible isolation valve.

R. Where water hammer arrestors are not indicated on the drawings install air chambers on hot and cold water supply piping to each fixture. Fabricate same size as supply pipe or ¾-inch minimum, and minimum 18 inches long.

3.05 INTERFACE WITH OTHER PRODUCTS

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install ball valves for throttling, bypass, or manual flow control services.
- E. Provide spring loaded check valves on discharge of water pumps.
- F. Provide balancing valves in water circulating systems where indicated.
- G. Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.06 CLEANING

- A. Division 01 Final Cleaning.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder and tablet or gas form, throughout system to obtain a residual from 50 to 80 mg/L.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651. Provide the Owner with a copy of the disinfection report.

SECTION 22 13 00

SANITARY WASTE AND VENT PIPING

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes pipe, pipe fittings, connections and equipment for sanitary sewer piping systems. This section also includes cleanouts.
 - B. Related Sections:
 - 1. Division 09 Painting.
 - 2. Section 22 05 29 Hangers and Supports.
 - 3. Section 22 05 53 Plumbing Identification.

1.02 REFERENCES

- A. ASME B123 (American Society of Mechanical Engineers) Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
- B. ASME B129 (American Society of Mechanical Engineers) Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings DWV.
- C. ASTM A74 Cast Iron Soil Pipe and Fittings.
- D. ASTM B32 Solder Metal.
- E. ASTM B306 Copper Drainage Tube (DWV).
- F. ASTM C564 Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- G. CISPI 301 (Cast Iron Soil Pipe Institute) Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
- H. CISPI 310 (Cast Iron Soil Pipe Institute) Joints for Hubless Cast Iron Sanitary Systems.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Submit data on pipe materials, fittings, and accessories.
- C. Provide manufacturers catalog information. Provide component sizes, rough-in requirements, service sizes, and finishes.
- D. Manufacturer's Installation Instructions: Submit installation instructions for all material and equipment.

1.04 CLOSEOUT SUBMITTALS

A. Division 01 – Contract closeout procedures.

- B. Project Record Documents: Record actual locations of equipment and clean-outs.
- C. Operation and Maintenance Data: Submit frequency of treatment required for interceptors.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.08 WARRANTY

A. Division 01 – Warranties and Bonds.

PART 2 PRODUCTS

2.01 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: CISPI 301, hub-less.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hub-less, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- B. Copper Tube: ASTM B306, DWV.
 - 1. Fittings: ASME B123, cast bronze, or ASME B129, wrought copper.
- C. Joints: ASTM B32, solder, Grade 50B.

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PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavate

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- 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. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for snaking drainage system.
- B. Encase exterior cleanouts in concrete flush with grade.
- C. Install floor cleanouts at elevation to accommodate finished floor.
- D. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- E. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- F. Install piping to maintain headroom. Do not spread piping, conserving space.
- G. Group piping whenever practical at common elevations.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- J. Provide access where valves and fittings are not expose. Coordinate size and location of access doors with Division 08.
- K. Do not install underground piping when bedding is wet or frozen.
- L. Establish elevations of buried piping outside the building to ensure adequate cover.
- M. Install piping penetrating roofed areas to maintain integrity of roof assembly.
- N. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- O. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Division 09.
- P. Excavate and backfill in accordance with Division 31.

Q. Establish invert elevations, slopes for drainage to 1/4 inch per foot minimum. Maintain gradients.

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SECTION 22 13 13

FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.01 SUMMARY

- A. The work covered by this Section includes the furnishing of all plant, labor, tools, equipment and materials, and performing all operations in connection with the installation of wastewater lines, onsite non-domestic and domestic waste disposal systems in accordance with the Alaska Department of Conservation (ADEC), these Specifications and applicable Drawings.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 311000 Site Clearing
 - 3. Section 312000 Earth Moving

1.02 REFERENCE STANDARDS

A. Except as noted herein, all work and material shall conform to the recommendations of the ADEC Onsite Wastewater System Installation Manual and meet the requirements of the 10 AAC 72 Wastewater Disposal regulations. All lines and grades for the waste disposal system shall be laid out with a properly maintained surveying instrument.

1.03 SUBSURFACE INVESTIGATIONS

- A. Information pertaining to subsurface investigation is available upon request. Neither the Owner nor the Engineer warrant that the soil logs represent the exact soils conditions at the location of construction. The bidder shall make his own deduction and conclusions as to the nature of the materials to be excavated, and the difficulties of making and maintaining the required excavations.
- B. The Contractor shall visit the sites and familiarize himself with the existing conditions and limitations of the work. No extras will be allowed because of the Contractor's misunderstandings of the amount of work involved or his lack of knowledge of any existing conditions.

1.04 SUBMITTALS

- A. Comply with pertinent requirement of the General Conditions.
- B. Submittals are required for the filter fabric, tanks, piping, and insulation.
- C. Provide certification that septic tank is ADEC approved.
- D. Submit gradation test for each source of washed sewer rock.
- E. AS-BUILT DRAWINGS
 - 1. The Contractor shall record on one set of Contract Documents all changes from the

locations originally indicated and record final locations and appropriate invert elevations for the wastewater lines, cleanouts, septic tank, non-domestic wastewater holding tank, absorption field, and monitoring tubes, and shall submit an accurate as-built drawing of the completed system to the Engineer.

PART 2 - PRODUCTS

2.01 PIPE

- A. Building Sewer (sewer line from building to septic/holding tanks)
 4" Schedule 40 ABS (ASTM F628)
 Pipe under footing shall be Cast Iron SV (Service) grade with hub and spigot joints and fittings conforming to ASTM A74
- B. Disposal Sewer (septic tank to drainfield)
 4" Schedule 40 ABS (ASTM F628)
 4" Schedule 40 PVC (ASTM D1785)
 4" Schedule 40 PVC (ASTM D2665)
 4" SDR 35 PVC (ASTM D3034)

Disposal Non-Domestic Wastewater (holding tank to rock-lined ditch) 1-1/4" HDPE SDR11 1-1/4" Schedule 40 PVC Pressure

- C. Drainfield (both solid and perforated pipe) 4" Schedule 40 PVC (ASTM D1785) 4" Schedule 40 PVC (ASTM D2665) 4" SDR 35 PVC (ASTM D3034) Perforated pipe shall have a minimum of one-half inch (1/2") diameter holes, maximum six inch (6") on center spacing, and the perforated rows shall be at a 120-degree (120°) angle from each other.
- D. Cleanouts, Vents, or Monitoring Tubes
 4" Schedule 40 ABS (ASTM F628)
 4" Schedule 40 PVC (ASTM D1785)
 4" Schedule 40 PVC (ASTM D2665)
 4" SDR 35 PVC (ASTM D3034)
- E. Couplings and Fittings Connections to wyes and service line and between dissimilar materials to be made with no hub couplers with stainless steel worm drive clamps. Provide gasketed joints and fittings at laterals.

Building sewer lines, disposal sewer lines, drainfield lines, cleanouts, and standpipes shall use solvent welded couplings and fittings of the same designation as the pipe being joined.

2.02 SEWER ROCK

A. Sewer Rock

There are two (2) specifications for sewer rock, coarse and fine. The fine graded sewer rock is for use in gravity fed bed or shallow trench type systems. Use the coarse graded sewer rock for all other types of system, including deep trench. Sewer rock for absorption fields shall be screened and washed and shall be substantially free of sand, silt and other fine-grained materials. Sewer rock must conform to the following gradations:

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Coarse Graded Sewer Rock – Specific Sieve Criteria

U.S. Standard Sieve	%Passing
3"	100
2"	0-100
1-1/2"	0-71
1"	0-30
3⁄4"	0-10
1/2"	0-5
#200	0-1

Fine Graded Sewer Rock – Specific Sieve Criteria

U.S. Standard Sieve	<u>%Passing</u>
2"	100
1-1/2"	90-100
1"	0-100
3⁄4"	0-10
1/2"	0-5
#200	0-1

B. Sand Liner

When specified on the drawings, provide sand liner under leach field conforming to the following gradation requirements:

US Standard Sieve	<u>%Passing</u>
#10	85-100
#20	60-90
#40	25-50
#60	Less than or equal to 15
#200	Less than 5

The sand may not have more than 45% of the total passing any one sieve and retained on the next consecutive sieve of those shown above.

2.03 SEPTIC TANK/NON-DOMESTIC WASTEWATER HOLDING TANK

A. Design

Septic tank design shall be such as to produce a clarified effluent consistent with accepted standards and shall provide adequate space for sludge and scum accumulations.

Non-domestic wastewater holding tank shall provide adequate space to store non-domestic wastewater.

B. Construction

Septic and Non-Domestic Wastewater tanks shall be constructed of solid durable materials not subject to excessive corrosion or decay and shall be watertight.

C. Compartments

Septic tanks shall have not less than two compartments unless otherwise approved by the Authority Having Jurisdiction. The inlet compartment of any septic tank shall be not less than two-thirds of the total capacity of the tank, nor less than 500 gallons liquid capacity, and shall be not less than 3 feet in width and 5 feet in length. Liquid depth shall be not less than 2 1/2 feet

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nor more than 6 feet. The secondary compartment of a septic tank shall have a capacity of not less than 250 gallons and a maximum capacity not exceeding one-third of the total capacity of such tank. In septic tanks having a 1500 gallon capacity, the secondary compartment shall be not less than 5 feet in length.

Non-domestic wastewater holding tank shall be single compartment. Liquid depth shall be not less than 2 $\frac{1}{2}$ feet nor more than 6 feet.

D. Access

Access to each septic tank shall be provided by not less than two manholes 20 inches in minimum dimension or by an equivalent removable cover slab. One access manhole shall be located over the inlet and one access manhole shall be located over the outlet. A 4 inch pipe shall be installed in the inlet and outlet covers, extending 1 foot above the ground for the purpose of access to pump the septic tank.

Access to each non-domestic wastewater holding tank shall be provided by not less than two manholes 20 inches in minimum dimension or by an equivalent removable cover slab. One access manhole shall be located over the inlet and one access shall be located at the lift station. A 4-inch pipe shall be installed in the inlet cover, extending 1 foot above the ground for the purpose of access to pump the holding tank.

E. Pipe Opening Sizes

The inlet and outlet pipe openings shall not be larger in size than the connecting sewer pipe. The vertical leg of round inlet and outlet fittings shall not be less in size than the connecting sewer pipe nor less than 4 inches. A baffle-type fitting shall have the equivalent cross-sectional area of the connecting sewer pipe and not less than a 4 inch horizontal dimension where measured at the inlet and outlet pipe inverts.

F. Pipe Extension

The inlet and outlet pipe or baffle shall extend 4 inches above and not less than 12 inches below the water surface. The invert of the inlet pipe shall be at a level not less than 2 inches above the invert of the outlet pipe.

G. Free Vent Area

Inlet and outlet pipe fittings or baffles and compartment partitions shall have a free vent area equal to the required cross-sectional area of the house sewer or private sewer discharging therein to provide free ventilation above the water surface from the disposal field or seepage pit through the septic tank, house sewer, and stack to the outer air.

H. Sidewalls

The sidewalls shall extend not less than 9 inches above the liquid depth. The cover of the tank shall be not less than 2 inches above the back vent openings.

I. Partitions and Baffles

Partitions or baffles between compartments shall be of solid, durable material and shall extend not less than 4 inches above the liquid level. The transfer port between compartments shall be a minimum size equivalent to the tank inlet, but in no case less than 4 inches in size, shall be installed in the inlet compartment side of the baffle so that the entry into the port is placed 65 percent to 75 percent in the depth of the liquid. Wooden baffles are prohibited.

J. Structural Design

The structural design of tanks shall comply with the following requirements:

1. Each such tank shall be structurally designed to withstand all anticipated earth or other

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loads. Septic tank covers shall be capable of supporting an earth load of not less than 500 pounds per square foot (lb/ft2) where the maximum coverage does not exceed 6 feet.

- 2. In flood hazard areas, tanks shall be anchored to counter buoyant forces during conditions of the design flood. The vent termination and service manhole of the tank shall be not less than 2 feet (610 mm) above the design flood elevation or fitted with covers designed to prevent the inflow of floodwater or the outflow of the contents of the tanks during conditions of the design flood.
- K. Materials

The minimum wall thickness of a steel septic tank shall be number 12 U.S. gauge, and each such tank shall be protected from corrosion both externally and internally by an approved bituminous coating according to UL 70 Standard for Septic Tanks, Bituminous-Coated Metal.

The minimum wall thickness of a steel non-domestic wastewater holding tank shall be 5/16", and each such tank shall be protected from corrosion both externally and internally by an approved TENMEC coating.

- L. Prefabricated Septic Tanks/Non-Domestic Wastewater Holding Tanks Prefabricated tanks shall comply with the following requirements:
 - 1. Manufactured or prefabricated septic tanks shall comply with approved applicable standards and be approved by the Authority Having Jurisdiction.
 - 2. Independent laboratory tests and engineering calculations certifying the tank capacity and structural stability shall be provided as required by the Authority Having Jurisdiction.

Cylindrical steel septic tanks shall be a minimum 1000 gallon capacity. Cylindrical steel non-domestic wastewater holding tanks shall have minimum 10,000 gallon capacity.

- M. Lifting eyelets shall be attached to the tank for ease of handling. All steel structural members shall be joined by electrical arc welding with fillets of adequate section for the joints involved. Welds shall be continuous inside and out. The supporting rings in the tank interior, where required and structural plates shall have continuous welds. The tank shall be watertight.
- N. After welding, all inside and outside surfaces of the structure shall be wire brushed and cleaned to remove loose rust, mill scale, wire slag, oil, and other deleterious material. All scratches in coating due to handling and shipping shall receive 2 applications of coating material in the field prior to burial.
- O. Tanks shall be constructed in compliance with uniform plumbing code (UPC) and Alaska Department of Environmental Conservation (ADEC) requirements.

2.04 INSULATION

- A. One inch (1") of approved insulation may be substituted for one foot (1') of soil cover, or two inches (2") of approved insulation may be substituted for two feet (2') of soil cover. The minimum soil cover shall not be reduced to less than two feet (2') with insulation. Filter fabric is still required with insulation.
- B. All geotechnical insulation products shall be InsulFoam 40 or equivalent. Geotechnical

insulation products shall meet the current ASTM standard specifications for "Rigid Cellular Polystyrene Thermal Insulation," and have a minimum compressive strength of 40 psi.

2.05 FILTER FABRIC

- A. All geotechnical fabric products shall be Typar 3401 or equivalent. Geotechnical fabric products shall conform to AASHTO M288 Class 3 and have the following characteristics:
 - 1. Minimum Permittivity (ASTM D4491) 0.5 sec⁻¹
 - 2. Maximum Apparent Opening Size (ASTM D4751) 0.20 to 0.21 mm (US Sieve #70)

PART 3 - EXECUTION

3.01 WASTEWATER LINE

A. The wastewater line shall be installed at a minimum grade of 2 percent and with a minimum cover of 4 feet. During installation care shall be taken to provide bedding free of rocks. All joints and connections in the wastewater line shall be watertight. The initial 6 inches of backfill over the pipe shall be free of rocks. Backfill and compaction shall be done in accordance with Section 312000 Earth Moving.

3.02 SEPTIC TANK / NON-DOMESTIC WASTEWATER TANK

- A. The Contractor shall excavate all holes, set tanks at proper location and grade, and backfill as specified herein.
- B. The hole for the tank shall be approximately 2 feet wider and longer than the tank. The bottom shall be smooth and level. Where over excavation occurs, the bottom shall be raised to final elevation in 6 inch compacted lifts. All water in the excavation must be removed and elevations checked before placing the tank. After setting the tank, it shall be filled with water to prevent floating, if necessary.

3.03 BACKFILLING

- A. Backfilling shall not be done until the Engineer has inspected and approved all work. All backfilling shall be accomplished with loose material in lifts of 12 inches or less. Such backfilling shall be compacted by hand tamping to 90 percent of the maximum dry density as determined by the standard proctor test. Backfilled holes shall be mounded from 4 inches to 6 inches to allow for settlement and shall be graded to drain away from the tank centerlines. Backfill shall consist of non-organic soils, free of roots, sticks, stumps and other debris. Excavated soil meeting the above requirement may be used as backfill material. The Contractor is responsible for providing the minimum cover as shown in the plans.
- B. Where insulation is required over the tank due to depth of backfill less than 4 feet, prior to completing the backfilling operation, install a 2 inch layer of insulation board 2 inches thick, located 6 inches above the top of the tank. The insulation shall extend 3 feet beyond the tank perimeter.

3.03 LEACH FIELD

A. The absorption fields shall be constructed to a depth as shown on plans, but not closer than 4 feet from the water table. Prior to placement of any materials, the Contractor shall excavate a

minimum of 4 feet deeper than the proposed bottom of the leach field. If the water table is less than 4 feet from the proposed bottom of the leach field, the Owner shall be notified.

- B. The perforated PVC pipe shall be installed with a minimum of 12 inches of sewer rock cover as shown on the Drawings. The pipe shall be level in all parts of the leach field.
- C. Once sewer rock has been placed, no construction equipment shall be allowed on the absorption field. All filling and grading operations shall either be accomplished by hand or reaching with backhoe type equipment. No compactive effort will be required or allowed on any portion of the absorption field.
- D. Backfill shall consist of non-organic soils, free of roots, sticks, stumps and other debris. Excavated soil meeting the above requirement may be used as backfill material. The Contractor is responsible for providing the minimum cover as shown in the plans. Up to two feet depth of backfill material may be replaced by a two inches thick layer of insulation if approved by the Engineer.
- E. In all cases, the top 2 feet of cover shall be backfill material. If necessary, material may have to either be used from foundation excavation, septic tank excavation, or imported to meet this requirement. Site shall be graded so that surface water will be directed away from the leach field.

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SECTION 22 14 00

STORM DRAINAGE PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes pipe, pipe fittings, connections and equipment for storm water piping systems. This Section also includes roof drains and cleanouts.
- B. Related Sections:
 - 1. Section 22 05 29 Hangers and Support.
 - 2. Section 22 05 53 Plumbing Identification: Product requirements for pipe identification for placement by this section.
 - 3. Division 26: Execution requirements for electric connections to equipment specified by this section.

1.02 REFERENCES

- A. ASTM A74 Cast Iron Soil Pipe and Fittings.
- B. ASTM C564 Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- C. CISPI 301 (Cast Iron Soil Pipe Institute) Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
- D. ASTM F708 Design and Installation of Rigid Pipe Hangers.
- E. ASME A112.21.2 (American Society of Mechanical Engineers) Roof Drains.
- F. AWWA C110 (American Water Works Association) Ductile Iron and Gray Iron Fittings 3 in. through 48 in., for Water and Other Liquids.
- G. AWWA C151 (American Water Works Association) Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
- H. MSS SP58 (Manufacturers Standardization Society of the Valve and Fittings Industry) Pipe Hangers and Supports Materials, Design and Manufacturer.
- I. MSS SP89 (Manufacturers Standardization Society of the Valve and Fittings Industry) Pipe Hangers and Supports Fabrication and Installation Practices.

1.03 SUBMITTALS

- A. Division 1 Administrative Requirements.
- B. Product Data: Submit Provide data on pipe materials, fittings, and accessories.
- C. Manufacturer's Installation Instructions: Submit installation instructions for all material and equipment.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

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1.04 CLOSEOUT SUBMITTALS

- A. Division 01 Contract Close-Out Procedures.
- B. Project Record Documents: Record actual locations of equipment and clean-outs.
- C. Operation and Maintenance Data: Submit spare parts lists, exploded assembly views for all pumps and equipment.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Division 01 Administrative Requirements; Product storage and handling requirements.
- B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Division 01 Administrative Requirements.
- B. Do not install underground piping when bedding is wet or frozen.

1.07 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.08 WARRANTY

A. Division 1 – Closeout Submittals.

PART 2 PRODUCTS

- 2.01 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
 - A. Cast Iron Pipe: ASTM A74 service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: ASTM C564, neoprene gasket system or lead and oakum.
 - B. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Neoprene gaskets and stainless-steel clamp-and-shield assemblies.

2.02 STORM WATER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Neoprene gaskets and stainless-steel clamp-and-shield assemblies.

2.03 CLEANOUTS

- A. Manufacturers:
 - 1. J.R. Smith.
 - 2. Josam.
 - 3. Zurn.
 - 4. Approved Equal.
- B. Exterior Surfaced Areas: Round cast nickel bronze access frame and non-skid cover.
- C. Exterior Unsurfaced Areas: Line type with lacquered cast iron body and round epoxy coated cover with gasket.
- D. Interior Finished Floor Areas: Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round scored cover with gasket in service areas and round depressed cover with gasket to accept floor finish (vinyl or tile) in finished floor areas. Provide adjustable carpet clamping frame at carpeted areas.
- E. Interior Finished Wall Areas: Line type with lacquered cast iron body and round epoxy coated cover with gasket, and round stainless steel access cover secured with machine screw.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Division 01 Administrative Requirements: Coordination and project conditions.
- B. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- 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. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for snaking drainage system.
- B. Encase exterior cleanouts in concrete flush with grade.
- C. Install floor cleanouts at elevation to accommodate finished floor.
- D. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

- E. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- F. Install piping to maintain headroom. Group piping to conserve space.
- G. Group piping whenever practical at common elevations.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- J. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Division 08.
- K. Install piping penetrating roofed areas to maintain integrity of roof assembly.
- L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- M. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Division 09.
- N. Excavate and backfill in accordance with Division 31.
- O. Install bell and spigot pipe with bell end upstream.
- P. Sleeve pipes passing through partitions, walls and floors.
- Q. Inserts:
 - 1. Provide inserts for placement in concrete forms.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide throughbolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- R. Pipe Hangers and Supports:
 - 1. Install in accordance with ASTM B31.9.
 - 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 [other] 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.
- 8. Provide copper plated hangers and supports for copper piping.
- 9. Prime coat exposed steel hangers and supports. Refer to Division 9. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- 10. Support cast iron drainage piping at every joint.

3.04 ERECTION TOLERANCES

- A. Division 01 Quality Requirements: Tolerances.
- B. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.

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Section 22 21 16 Plumbing Piping Specialties

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes pressure gages and pressure gage taps, thermometers and thermometer wells, expansion tanks, strainers, and balance valves.
- B. Related Sections:
 - 1. Section 22 11 00– Domestic Water Piping.

1.02 REFERENCES

- A. ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Codes, SEC VIII-D Rules for Construction of Pressure Vessels.
- B. ASME B40.1 (American Society of Mechanical Engineers) Gauges Pressure Indicating Dial Type Elastic Element.
- C. ASTM E1 Standard Specification for ASTM Thermometers.
- D. ASTM E77 Standard Test Method for Inspection and Verification of Thermometers.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Submit for manufactured products and assemblies required for this Project.
 - 1. Manufacturer's data indicating use, operating range, total range, accuracy, and location for manufactured components.
 - 2. Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
 - 3. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each specialty.
 - 4. Submit electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures, application, selection, and hookup configuration. Include pipe and accessory elevations.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 Contract closeout procedures.
- B. Project Record Documents: Record actual locations of actual locations of components and instrumentation.

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C. Operation and Maintenance Data: Submit instructions for calibrating instruments, installation instructions, assembly views, servicing requirements, lubrication instruction, and replacement parts list.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.06 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. Protect systems from entry of foreign materials by temporary covers, caps and closures, completing sections of the work, and isolating parts of completed system until installation.
- D. Do not install instruments when areas are under construction, except for required rough in, taps, supports and test plugs.

1.07 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.08 WARRANTY

- A. Division 01 Warranties and Bonds.
- B. Provide one-year manufacturer warranty for piping specialties.

PART 2 PRODUCTS

- 2.01 PRESSURE GAGES
 - A. Manufacturers:
 - 1. Trerice.
 - 2. Marshaltown.
 - 3. Ashcroft.
 - 4. Approved Equal.
 - B. Gage: ASME B40.1, with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
 - 1. Case: Cast aluminum.
 - 2. Bourdon Tube: Phosphor bronze.

- 3. Dial Size: 3-1/2" diameter.
- 4. Mid-Scale Accuracy: One percent.
- 5. Scale: psi.

2.02 PRESSURE GAGE TAPS

- A. Needle Valve: Brass, ¼ inch NPT for minimum 300 psi.
- B. Ball Valve: Brass for 250 psi.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch NPT connections.

2.03 STEM TYPE THERMOMETERS

- A. Manufacturers:
 - 1. Trerice.
 - 2. Marshaltown.
 - 3. Ashcroft.
 - 4. Approved Equal.
- B. Thermometer: ASTM E1, adjustable angle, red appearing mercury, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.
 - 1. Size: 9-inch scale.
 - 2. Window: Clear Lexan.
 - 3. Stem: Extended brass, ³/₄ inch NPT.
 - 4. Accuracy: ASTM E77, 2 percent.
 - 5. Calibration: Both °F and °C.

2.04 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

2.05 DIAPHRAGM-TYPE EXPANSION TANKS

- A. Manufacturers:
 - 1. Amtrol.
 - 2. Taco.
 - 3. Armstrong.
 - 4. Approved Equal.

- B. Construction: Welded steel, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel support legs or saddles. If required by the drawing's schedules: tested and stamped in accordance with ASME SEC 8-D; supplied with National Board Form U-1
- C. Accessories: Pressure gage and air-charging fitting, tank drain; pre-charge to 12 psig.

2.06 STRAINERS

- A. Manufacturers:
 - 1. Grinnell.
 - 2. Armstrong.
 - 3. Bell & Gossett.
 - 4. Approved Equal.
- B. Size 2 inch and Under:
 - 1. Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32" stainless steel perforated screen.
 - 2.
- C. Size 2-1/2 inch to 4 inch:
 - 1. Flanged iron body for 175 psig working pressure, Y pattern with 3/64" stainless steel perforated screen.

2.07 BALANCE VALVES

- A. Manufacturers:
 - 1. Bell & Gossett.
 - 2. Taco.
 - 3. Approved Equal.
- B. Calibrated, ball or plug type balance valve with precision machined orifice, readout valves equipped with integral check valves and gasketed caps, calibrated nameplate and indicating pointer. Threaded connections.

2.08 RELIEF VALVES

- A. Manufacturers:
 - 1. Watts.
 - 2. Taco.
 - 3. Bell & Gossett.
 - 4. Approved Equal.

B. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated capacities ASME certified and labeled.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install positive displacement meters in accordance with AWWA M6, with isolating valves on inlet and outlet. Provide full line size bypass with ball valve for liquid service meters.
- B. Install one pressure gage per pump, with taps on suction and discharge of pump; pipe to gage.
- C. Install gage taps in piping.
- D. Install pressure gages with pulsation dampers. Provide needle valve or ball valve to isolate each gage. Extend nipples to allow clearance from insulation.
- E. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- F. Install thermometer sockets adjacent to controls systems thermostat, transmitter, or sensor sockets. Where thermometers are provided on local panels, or pipe mounted thermometers are not required.
- G. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- H. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- I. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- J. Provide drain and hose connection with valve on strainer blow down connection.
- K. Provide balancing valves on water outlet from pumps.
- L. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- M. Pipe relief valve outlet to nearest floor drain.
- N. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.
- O. Install flexible expansion loops in accordance with manufacturer's instructions. Where loops are installed hanging down, provide low point drain. Where loops are installed horizontal, provide end of loop support. Do not install with loops straight up to prevent air traps. Provide pipe guide within four pipe diameters of loop.
- 3.02 FIELD QUALITY CONTROL
 - A. Division 1 Quality Requirements.

B. Test for strength of glycol and water solution and submit written test results.

3.03 CLEANING

- A. Division 1 Contract closeout procedures.
- B. Clean and flush glycol system.
- 3.04 PROTECTION OF INSTALLED CONSTRUCTION
 - A. Do not install gauges until after systems are cleaned.

SECTION 22 21 23

PLUMBING PUMPS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes system lubricated circulators.
- B. Related Sections:
 - 1. Section 22 13 00 Sanitary Waste and Vent Piping: Execution requirements for connection to pumps specified by this section.
 - 2. Division 26.

1.02 REFERENCES

A. UL 778 (Underwriters Laboratories, Inc.) - Motor Operated Water Pumps.

1.03 PERFORMANCE REQUIREMENTS

A. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

1.04 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements. Submit also, manufacturer model number, dimensions, service sizes and finishes.
- C. Manufacturer's Installation Instructions: Submit application, selection, and hookup configuration with pipe and accessory elevations. Submit hanging and support requirements and recommendations.

1.05 CLOSEOUT SUBMITTALS

- A. Division 01 Contract Close-Out Procedures.
- B. Operation and Maintenance Data: Submit installation instructions, servicing requirements, assembly views, lubrication instructions, and replacement parts list.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years' experience.

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1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- 1.08 FIELD MEASUREMENTS
 - A. Verify field measurements prior to fabrication.

1.09 WARRANTY

- A. Division 01 Warranties and Bonds.
- B. Provide one-year manufacturer warranty for pumps.

PART 2 PRODUCTS

2.01 SYSTEM LUBRICATED CIRCULATORS

- A. Manufacturers:
 - 1. Taco.
 - 2. Armstrong.
 - 3. Bell & Gossett.
 - 4. Grundfos.
 - 5. Approved Equal.
- B. Type: Horizontal shaft, single stage, direct connected with multiple speed (where scheduled), wet rotor motor for in-line mounting, for 140 psig maximum working pressure, 230 degrees F maximum water temperature.
- C. Casing: Cast iron or Bronze (where scheduled) with flanged pump connections.
- D. Impeller, Shaft, Rotor: Stainless Steel.
- E. Bearings: Metal Impregnated carbon (graphite) and ceramic.
- F. Motor: Impedance protected.

PART 3 EXECUTION

- 3.01 INSTALLATION
 - A. Install long radius reducing elbows or reducers between pump and piping. Support piping adjacent to pump such that no weight is carried on pump casings.
 - B. Provide line sized shut-off valve and strainer on pump suction, and line sized soft seat check valve and balancing valve on pump discharge.

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- C. Lubricate pumps before start-up.
- 3.02 FIELD QUALITY CONTROL
 - A. Division 01 Quality Requirements: Testing and Inspection Services.
 - B. Section 23 05 93 Testing, Adjusting, and Balancing.
SECTION 22 34 01

DOMESTIC HOT WATER GENERATORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes commercial hot water generators.
- B. Related Sections:
 - 1. Division 26- Wiring Connections: Execution requirements for electric connections specified by this section.

1.02 SUBMITTALS

- A. Division 01 Submittal Procedures.
- B. Product Data: Submit dimensioned drawings of hot water generators indicating components and connections to other equipment and piping. Provide electrical characteristics and connection.
- C. Manufacturer's Installation Instructions: Submit mounting and support requirements.

1.03 CLOSEOUT SUBMITTALS

- A. Division 01 Contract Closeout.
- B. Operation and Maintenance Data: Submit replacement part numbers and availability.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Division 01 Delivery, Storage and Handling.
- B. Accept water heaters on site in original labeled cartons. Inspect for damage.

1.06 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.07 WARRANTY

A. Provide one-year manufacturer warranty for hot water generator.

PART 2 PRODUCTS

PAGE 2 OF 2

2.01 HOT WATER GENERATORS

- A. Manufacturers:
 - 1. Amtrol.
 - 2. SuperStor.
 - 3. Approved Equal.
- B. Tank: Polyethylene water reservoir, thermally insulated with minimum 1-inch polyurethane, encased in a rigid urethane shell; outer steel shell with urethane coating; floor shield and legs.
- C. Heat Exchanger: Replaceable copper tube, double wall vented construction.
- D. Accessories: Union water connections and ASME rated temperature and pressure relief valve.
- E. Controls: Closed well aquastat. Electronic control capable selecting desired hot water temperature, digital readout of temperature.

PART 3 EXECUTION

- 3.01 INSTALLATION
 - A. Install hot water generators in accordance with the manufacturer's requirements.
 - B. Coordinate with plumbing piping, hydronic piping and electrical work to achieve operating system.
 - C. Seismically restrain units in accordance with Uniform Building Code requirements.

END OF SECTION

PLUMBING FIXTURES

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes water closets, urinals, lavatories, sinks, mop sinks, drinking fountains and showers.
 - B. Related Sections:
 - 1. Section 22 11 00 Domestic Water Piping.
 - 2. Section 22 13 00 Sanitary Waste and Vent Piping.
 - 3. Division 07 Joint Sealant: Product requirements for calking between fixtures and building components for placement by this section.

1.02 REFERENCES

- A. ASME A112.6.1 (American Society of Mechanical Engineers) Supports for Off-the-Floor Plumbing Fixtures for Public Use.
- B. ANSI Z124.2 Gel-Coated Glass-Fiber Reinforced Polyester Resin Shower Receptor and Shower Stall Units.
- C. ASME A112.18.1 (American Society of Mechanical Engineers) Finished and Rough Brass Plumbing Fixture Fittings.
- D. ASME A112.19.2 (American Society of Mechanical Engineers) Vitreous China Plumbing Fixtures.
- E. ASME A112.19.3 (American Society of Mechanical Engineers) Stainless Steel Plumbing Fixtures.
- F. ASME A1121.1 (American Society of Mechanical Engineers) Floor Drains.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Submit catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Installation Instructions: Submit installation methods and procedures.
- D. Lead Free Certification: Submit lead free certification from manufacturer for all fixtures and trim.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 Contract closeout procedures.
- B. Operation and Maintenance Data: Submit fixture, trim, exploded view and replacement parts lists.

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1.05 QUALITY ASSURANCE

- A. Ensure that products requiring electrical connections are listed and classified by Underwriters Laboratories Inc.
- B. Lead Free: All fixtures and trim shall be lead free and certified as lead free by the manufacturer.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- 1.07 DELIVERY, STORAGE, AND HANDLING
 - A. Accept fixtures on site in factory packaging. Inspect for damage.
 - B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.08 WARRANTY

- A. Division 01 Warranties and Bonds.
- B. Provide one-year manufacturer warranty for plumbing fixtures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers China Fixtures:
 - 1. Kohler.
 - 2. American Standard.
 - 3. Eljer.
- B. Manufacturers Stainless Steel Sinks:
 - 1. Just.
 - 2. Elkay.
- C. Manufacturers Janitor Sinks:
 - 1. Fiat.
 - 2. Kohler.

K+A design

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D.	Manufacturers – Service Sinks:					
	1.	American Standard.				
	2.	Fiat.				
E.	Manufa	acturers – Lavatory and Sink Faucets:				
	1.	Delta.				
	2.	Chicago Faucets.				
F.	Manufacturers – Flush valves:					
	1.	Sloan.				
G.	Manufacturers – Showers:					
	1.	Fiat.				
	2.	Kohler.				
Н.	Manufacturers – Shower Valves:					
	1.	Delta.				
I.	Manufacturers – Emergency Combination Units and Face and Eye Wash:					
	1.	Haws.				
	2.	Guardian equipment.				
J.	3. Manufa	3. Manufacturers – Hose Stations:				
	1.	Leonard.				
K.	Manufacturers – Hose Bibbs:					
	1.	Woodford.				
	2.	J.R. Smith.				
	3.	Zurn.				
L.	4. Manufacturers - Floor Drains and Floor sinks					
	1.	J.R. Smith.				
	2.	Josam.				
	3.	Zurn.				

- Μ. Manufactures - Oil Interceptors
 - Anchorage Tank and Welding. 1.

- 2. J.R. Smith.
- 3. Zurn.
- N. Manufacturers Roof Drains and Overflow Drains
 - 1. J.R. Smith.
 - 2. Josam.
 - 3. Zurn.
- O. Approved Equal.
- 2.02 FLUSH TANK WATER CLOSETS, ADA (WC-1)
 - A. Bowl: ASME A112.19.2; wall hung, siphon jet vitreous china closet bowl, with elongated rim, insulated vitreous china closet tank with fittings and lever flushing valve and chrome plated bolt caps.
 - B. Seat: Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts.
 - C. Wall Mounted Carrier: ASME A112.6.1; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.
- 2.03 WALL HUNG URINALS, ADA (UR-1)
 - A. Urinal: ASME A112.19.2; vitreous china, wall hung washout urinal with shields, integral trap, removable stainless steel strainer, 3/4 inch spud, steel supporting hanger.
 - B. Exposed Flush Valve: ASME A112.18.1; exposed chrome plated, diaphragm type with oscillating handle, escutcheon, integral screwdriver stop, vacuum breaker; maximum 1 gallon flush volume.
 - C. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.
- 2.04 LAVATORIES (L-1)
 - A. Vitreous China Wall Hung Basin: ASME A112.19.2; vitreous china wall hung lavatory 21" x 18" minimum, with 5 inch high back, drillings on 4 inch centers, rectangular basin with splash lip, front overflow.
 - B. Trim: ASME A112.18.1; chrome plated combination supply fitting, offset open grid strainer, water economy aerator with maximum 2.0 gpm flow, single lever handle.
 - C. Pipe Insulation: ADA compliant under sink protective covers for drain piping, hot water piping, cold water piping and angle stops. Molded closed cell vinyl with antimicrobial surface, white color, hinged snap lock lids at angle stops. Truebro or equal.
 - D. Accessories: Chrome plated 17-gauge brass P-trap and arm with escutcheon, screwdriver stops and flexible braided stainless steel supplies.

- E. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.
- 2.05 DOUBLE COMPARTMENT SINKS (SK-1)
 - A. Double Compartment Bowl: 25" x 20" x 10-1/2" deep outside dimensions, 18 gauge thick, Type 304 stainless steel. Self-rimming and undercoated, with 3-1/2 inch crumb cup and tailpiece, ledge back drilled for trim.
 - B. Trim: ASME A112.18.1; cast brass body, chrome plated supply fitting, adjustable centers, offset open grid strainer, vandal resistant water economy aerator with maximum 2.2 gpm flow, 8" swing spout, vandal resistant 6" single lever handle.
 - C. Accessories: Chrome plated 17gauge brass P-trap and arm with escutcheon, screwdriver stop and flexible braided stainless steel supplies.
- 2.06 SERVICE SINKS (SK-2)
 - A. Bowl: ASME A112.19.1; 24 x 20 x 11 inch deep, acid resistant porcelain enameled (inside only) cast iron roll-rim sink, with 9 inch high back, concealed hanger, chrome plated strainer, stainless steel rim guard, cast iron P-trap with adjustable floor flange
 - B. Trim: ASME A112.18.1 exposed wall type supply with lever handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.
- 2.07 DOUBLE COMPARTMENT SINKS (SK-3)
 - A. Double Compartment Bowl: 25" x 20" x 10-1/2" deep outside dimensions, 18 gauge thick, Type 304 stainless steel. Self-rimming and undercoated, with 3-1/2 inch crumb cup and tailpiece, ledge back drilled for trim.
 - B. Trim: ASME A112.18.1; cast brass body, chrome plated supply fitting, adjustable centers, offset open grid strainer, vandal resistant water economy aerator with maximum 2.2 gpm flow, 8" swing spout, vandal resistant 6" single lever handle. Air gap fitting for dishwasher at kitchen application.
 - C. Accessories: Chrome plated 17gauge brass P-trap and arm with escutcheon, screwdriver stop and flexible braided stainless steel supplies.
- 2.08 SINKS (SK-4)
 - A. Refer to Division 10 Miscellaneous Specialties.
 - B. Trim: Refer to Division 10 Miscellaneous Specialties.
 - C. Accessories: Chrome plated 17gauge brass P-trap and arm with escutcheon, screwdriver stop and flexible braided stainless steel supplies.
- 2.09 SINKS (SK-5)
 - A. Refer to Division 10 Miscellaneous Specialties.
 - B. Trim: Refer to Division 10 Miscellaneous Specialties.

- C. Accessories: Chrome plated 17gauge brass P-trap and arm with escutcheon, screwdriver stop and flexible braided stainless steel supplies.
- 2.10 JANITOR SINKS (SK-6)
 - A. Bowl: 24 x 24 x 10 inch high, white, molded stone, floor mounted, with one-inch wide shoulders, vinyl bumper guard, stainless steel strainer.
 - B. Trim: ASME A112.18.1 exposed wall type supply with lever handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.
 - C. Accessories: 5 feet of ½ inch diameter plain end reinforced rubber hose, hose hanger, bumper guard and mop hanger.
- 2.11 SHOWERS (SH-1)
 - A. Cabinet: ANSI Z124.2 continuous cast acrylic reinforced with a fiberglass strand/polyester resin mix, 44 x 39 x 84 inch high, with integral receptor, soap dish, removable chrome plated strainer, tailpiece, white color.
 - B. Trim: ASME A112.18.1; ADA compliant, flush mounted shower assembly with lever handle, pressure balanced control valve, integral stops, shower head, wall supply elbow. Vinyl curtain and stainless steel curtain rod.
- 2.12 EMERGENCY COMBINATION UNIT (ESH-1)
 - A. Shower: ANSI Z358.1; free standing, self- cleaning, non-clogging 10 inch diameter plastic shower head, instant action stay open valve activated by rigid stainless steel pull rod.
 - B. Eye/face wash: ANSI Z358.1; plastic bowl with elbow, 1-1/4 inch galvanized steel pipe pedestal with floor flange, push flag or foot pedal, wrap-around spray head, dust cover assembly.
 - C. Supply and Waste Piping: 1-1/4 inch galvanized steel pipe pedestal with floor flange.
 - D. Furnish universal emergency sign.
 - E. Tempered Water Blending System:
 - 1. Provide warm water 60° F-85° F, flow 2–35 GPM, no electrical components, Fail Safe Back Up System, with high temperature limit valve set at 85° F and flow cold water bypass, outlet temperature gauge.
 - 2. Supply and Waste Piping: 1-1/4 inch pipe.
 - 3. Enclosure: Corrosion-resistant fiberglass, security latch, 16 x 10-1/4 19-1/2 inch high.
- 2.13 WASHING MACHINE VALVE BOX (WB-1)
 - A. 20 gauge steel rough-in box, white enamel finish, water tight construction with sloped bottom, with brass valves with single wheel handle, socket for 2 inch waste.

2.14 REFRIGERATOR WATER CONNECTION BOX – (RB-1)

- A. Manufacturers
 - 1. Oatey.
 - 2. Guy Gray/IPS Corporation.
 - 3. Sioux Chief.
 - 4. Approved Equal.
- B. NSF 61 Section 9 compliant, high impact polystyrene, rough-in box, white finish, face plate, water tight construction, with 1/4 turn brass valve with water hammer arrestor.

2.15 SINGLE DRINKING FOUNTAINS – (DF-1)

- A. A. Exposed Fountain: ADA compliant, wall mounted, 18 gauge Type 304 stainless steel polished to satin finish, lead free waterway system, with elevated anti-squirt vandal resistant bubblers with flexible stream guard, in-line flow regulator, in-line strainer, vandal resistant front push button operation, bottom cover plate, wall plate, mounting plate, support carrier and screwdriver stop.
- 2.16 OIL WATER SEPARATOR (OS-1)
 - A. Interceptor: 108 x 25 x 72 inch high, 25 gpm flow, inlet and outlet size 4 inch, heavy duty traffic cover, air relief, cleanout, 53 gallon oil holding capacity integral storage, coalescing plate and 3 inch vent connections. Alarm / monitoring control panel with all required sensors.
- 2.17 FLOOR DRAIN (FD-1)
 - A. ANSI A1121.1: lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer. Provide trap primer connection.
- 2.18 FLOOR DRAIN (FD-2)
 - A. ANSI A1121.1: lacquered cast iron deep body with drainage flange, weep holes, round nickel bronze tractor gate, and free standing, suspended, slotted sediment bucket. Provide trap primer connection.
- 2.19 HOSE STATION (HS-1)
 - A. Thermostatic Water Mixer, two stop and check valves with color coded heat resistant handles on inlets, thermostatic mixing valve, solid bimetal thermostat directly linked to valve porting, high temperature limit stop, heat resistant temperature adjusting lever, integral wall support, outlet with dial thermometer (20 to 240° F), vacuum breaker, chrome plated finish and stainless steel hose rack.
 - B. Supply and Waste Piping: 3/4 inch hot water inlet, 3/4 inch cold water inlet and outlet.

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2.20 HOSE BIBB EXTERIOR - (HB-1)

- A. Exterior: ANSI/ASSE 1019 ; non-freeze, self-draining type with flush mounted brass wall box, hose thread spout, removable key, and integral vacuum breaker. Wall box shall be designed for installation in one standard modular brick course.
- B. Extra Materials: Supply two loose keys for each outside hose bibb.
- 2.21 HOSE BIBB INTERIOR (HB-2)
 - A. Interior: Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, with hand wheel, integral vacuum breaker in conformance with ANSI/ASSE 1011.
- 2.22 ROOF DRAINS (RD-1)
 - A. Cast bronze with combined rough bronze grate and flashing clamp and gasket.
- 2.23 OVERFLOW DRAINS (OD-1)
 - A. Cast bronze body with combined rough bronze grate and flashing clamp and gasket, 2" dam.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide flexible supplies to fixtures with screwdriver stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Division 07, color to match fixture.

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3.04 INTERFACE WITH OTHER PRODUCTS

- A. Review millwork shop-drawings. Confirm location and size of fixtures and openings before rough in and installation.
- 3.05 ADJUSTING
 - A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.
- 3.06 CLEANING
 - A. Division 01 Final cleaning.
 - B. Clean plumbing fixtures and equipment.
- 3.07 PROTECTION OF INSTALLED CONSTRUCTION
 - A. Do not permit use of fixtures before final acceptance.

END OF SECTION

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SECTION 23 00 00

BASIC HVAC REQUIREMENTS

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes basic mechanical requirements, basic mechanical methods, restricted materials, motors for mechanical equipment, vibration isolation, seismic restraint, painting of mechanical systems, and mechanical systems testing.
 - B. Related Sections:
 - 1. Division 01: All sections of Division 1 as they pertain to general contract requirements.
 - 2. Division 09 Painting: Painting of mechanical systems.
 - 3. Division 26: Electrical requirements for mechanical equipment.

1.02 SUBMITTALS

- A. Division 1 Shop drawings, product data and samples.
- B. Submittal Requirements: In addition to submittal procedures as outlined under Division 1, mechanical submittals shall be submitted as follows:
 - 1. Mechanical submittals shall be submitted complete and all at one time. Partial submittals will not be considered and will be returned without review. In some cases, the Owner's Representative may review partial submittals where early ordering of some equipment is essential to the project. Review of such partial submittals is at the discretion of the Owner's Representative. Any project delay due to the Contractor's failure to make complete submittals shall be the responsibility of the Contractor. Submittals shall be compiled in a notebook. The data shall be arranged and indexed by specification sections.
 - 2. Catalog sheets shall be complete, and the item or model proposed for use by the Contractor shall be clearly marked and identified as to which item in the specifications or on the drawings is being submitted.

1.03 CLOSEOUT SUBMITTALS

- A. Division 1 Contract closeout procedures.
- B. Contract Closeout Requirements: In addition to contract closeout requirements as outlined under Division 1, mechanical contract closeout requirements shall include the following:
 - 1. Record Documents:
 - a) Record Drawings.
 - b) Operation & Maintenance Manuals.
 - c) Valve Tag Schedule.
 - 2. Testing Reports.

- 3. Equipment Startup Reports.
- 4. Balancing Reports.
- 5. Systems Demonstrations.
- 6. Operation & Maintenance Instruction.

1.04 RECORD DOCUMENTS

- A. Record Drawings: In addition to record drawing requirements as outlined under Division 1, mechanical record drawings shall include the following:
 - 1. Any and all changes made in the field with respect to original design drawings.
 - 2. Actual valve locations and valve tag identification.
- B. Shop Drawings: Control system, fire protection, and other specialty system shop drawings shall be provided to the Owner. Record shop drawings shall be produced utilizing AutoCAD 2017 or more current release and provided on PDF digital format on a USB 3.0 or higher thumb drive.
- C. Operation & Maintenance Manuals: In addition to Operation & Maintenance Manual requirements as outlined under Division 1, mechanical O&M manuals shall include the following:
 - 1. Product data for each piece of equipment including local supplier and local manufacturer's representative including address, phone number, and fax number
 - 2. Manufacturers operation & maintenance instructions for each piece of equipment.
 - 3. Identification numbers for all parts and nearest source for obtaining parts.
 - 4. Verbal description of each system.
 - 5. Summary of maintenance instructions to Owner.
 - 6. Periodic maintenance form.
 - 7. Testing reports.
 - 8. Equipment startup reports.
 - 9. Final balance report.
 - 10. Valve schedule.
 - 11. Reduced scale record drawings.
 - 12. Reduced scale shop drawings.
- D. Valve Tag Schedule: The Contractor shall provide a framed valve tag schedule located in the boiler room.

1.05 OPERATION & MAINTENANCE INSTRUCTION

- A. Notification: The Contractor shall notify the Owner's Representative in a timely manner to schedule O&M instruction such that facility personnel may be present for such instruction.
- B. Instruction: The Contractor shall provide detailed instruction on the operation and maintenance requirements for all mechanical systems. Instruction shall include class time with maintenance personnel and thorough on-site observations and review of each mechanical system and applicable equipment.

1.06 SUBSTITUTIONS

- A. Division 1 Product Options and Substitutions.
- B. Substitution Requirements: In addition to substitution requirements as outlined under Division
 1, mechanical material and equipment substitutions shall meet the following minimum requirements:
 - 1. Size: Proposed substitutions shall be of equivalent size and fit within available space with adequate service access as recommended by the equipment manufacturer.
 - 2. Performance: Proposed substitutions shall have equal or superior performance to specified equipment.
 - 3. Quality: Proposed substitutions shall be of equal or greater quality to specified equipment.
 - 4. Weight: Proposed substitutions shall be of equal weight to specified equipment or Contractor shall be responsible for modifications to structure as required for increased weight.
 - 5. Accessories and Options: Proposed substitutions shall be provided with appropriate accessories and options as required for a complete and operational system.
 - 6. System Modifications: The Contractor shall be responsible for modifications to mechanical systems, electrical systems, and building structure and finishes as required for implementing proposed substitute products.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable local codes and amendments including but not limited to the following.
 - 1. International Building Code (IBC) 2012 Edition
 - 2. Uniform Plumbing Code (UPC) 2012 Edition
 - 3. International Mechanical Code (IMC) 2012 Edition
 - 4. International Fire Code (IFC) 2012 Edition
 - 5. National Electric Code 2014 Edition
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.
- 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered, stored, and handled at the project site to prevent damage and facilitate inspection.
- B. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering.

1.09 RESTRICTED MATERIALS

- A. Materials containing asbestos in any form are not allowed. Where materials or equipment provided by the Contractor are found to contain asbestos, such items shall be removed and replaced with non-asbestos items at no additional cost to the Owner.
- B. Materials containing lead are not allowed unless specifically referenced in these specifications. Where materials or equipment provided by the Contractor are found to contain lead, such items shall be removed and replaced with lead free materials at no additional cost to the Owner.

1.10 BASIC MECHANICAL METHODS

- A. Installation Instructions: Comply with manufacturer's published instructions for delivery, storage, protection, installation, and materials.
- B. Operation of Equipment during Construction: When equipment is operable, and it is to the advantage of the Contractor to operate the equipment during construction, such equipment may be operated provided that the operation is properly supervised, and the Contractor retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install new filter media, make all required adjustments, and complete all punch list items before final acceptance by the Owner's Representative.
- C. Service Access: Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- D. Access Doors: Where mechanical equipment requiring access (including valves) is located above GWB ceilings, within wall assemblies, or other non-readily accessible locations; access doors shall be provided. Access doors within areas of public occupancy shall be lockable type.
- E. Mounting Heights: Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.
- F. Exposed Systems: Items exposed (in areas without ceilings) shall be installed in a neat, orderly manner. Elements shall be perpendicular and parallel to building lines. Items exposed in normally occupied areas (not including mechanical rooms) shall be finished in accordance with specifications. In those conditions where ductwork is exposed in finished areas, careful craftsmanship and only the highest standards of installation will be acceptable. All routing of exposed ducts, pipes, conduits, shall be approved in advance by the Owner's Representative prior to installation.

- G. Drawings and Specifications:
 - 1. The Drawings indicate the general arrangement of systems and are to be followed insofar as possible. If substantial deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Owner's Representative, for approval before proceeding with the work.
 - 2. This Contractor shall make all measurements in the field and shall be responsible for correct fitting. Contractor shall coordinate this work with all other trades in such a manner as to cause a minimum of conflict or delay.
 - 3. Where any work is placed as to cause or contribute to a conflict it shall be readjusted at the expense of the Contractor. The Owner's Representative's decision shall be final regarding the arrangement of ducts, piping, etc, where conflict arises.
 - 4. Where offsets in systems are required to complete the installation, or for the proper operation of the system, these shall be deemed to be included in the Contract.
 - 5. Significant deviations from drawings must be approved by the Owner's Representative.
- H. Location of Mechanical Systems:
 - 1. Mechanical layouts indicated on drawings are diagrammatical. Exact locations of ducts, pipes, and equipment may vary because of conflicts with work of other trades.
 - 2. Locate equipment requiring periodic servicing so that it is readily accessible. Do not back up service sides to walls, nor place it too close to other equipment to make service impractical.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials and equipment shall be new, unused, and delivered to site in manufacturer's original packaging.
- B. Equipment shall be regularly cataloged items of the manufacturer and shall be supplied as a complete unit in accordance with the manufacturer's standard specifications. Optional items shall be provided as required for proper installation unless noted otherwise. Manufacturer's identification shall be maintained for all equipment.

2.02 MOTORS

- A. Motors: Motors for mechanical equipment shall be furnished by the equipment manufacturer, for the specific application and duty applied, and as required to deliver rated horsepower without exceeding temperature ratings when operated on power systems with a combined variation in voltage and frequency not more than plus or minus 10% of rated voltage. Motors for pumps and fans shall be selected for non-overloading.
- B. Electrical Characteristics: The Contractor shall verify from the drawings and specifications available electrical power characteristics and furnish equipment that will perform satisfactorily under the conditions as shown and specified.

- C. Service Factor: Motors shall be sized for 1.15 service factor and not to exceed 40 degrees C. temperature rise above ambient.
- D. Motors on belt driven equipment shall have slide rails with adjusting screws for belt tension adjustment. Motors exposed to the weather shall be weather-protected.
- E. Fractional horsepower motors shall have self-resetting thermal overload switches.
- F. Motor sound power levels shall not be greater than recommended in NEMA MG 1-12.49.
- G. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned or balanced.

2.03 VIBRATION ISOLATION

- A. General: Rotating equipment shall be provided with vibration isolation except for small in-line circulating pumps. Where mechanical equipment is provided with internal vibration isolation, external vibration isolation is not required unless specifically indicated on drawings.
- B. Internal Vibration Isolation: Internal vibration isolation equipment shall be sized by the equipment manufacturer to provide appropriate isolation with respect to equipment rotating characteristics. Earthquake snubbers shall be provided where required.
- C. External Vibration Isolation: External vibration isolation shall be provided where indicated on drawings. Vibration isolation equipment shall be sized by the manufacturer-based equipment rotating characteristics to provide appropriate isolation. Earthquake snubbers shall be provided where required.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- B. Report in writing to Owner's Representative prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.02 INSTALLATION – GENERAL

A. Install in accordance with manufacturer's instructions.

3.03 INSTALLATION – MOTORS

- A. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- B. Check line voltage and phase and ensure agreement with nameplate.
- C. Make electrical connections and test motor for proper rotation/ phasing under Division 26.

D. Adjust motors together with driven equipment to insure equipment is dynamically and statically balanced. Correct any excessive vibration or noise from the equipment.

3.04 SEISMIC RESTRAINT OF MECHANICAL EQUIPMENT

A. Seismically restrain equipment in accordance with the International Building Code. Seismic restraint assemblies shall be premanufactured, or field fabricated, secured to building structural components.

3.05 SEISMIC RESTRAINT OF PIPING AND DUCTWORK SYSTEMS

- A. Seismically restrain all piping and ductwork systems in accordance with the SMACNA Seismic Restraint Manual Guidelines for Mechanical Systems.
- B. Seismic restraint shall be in accordance with Seismic Hazard Level (SHL) A of the SMACNA Seismic Restraint Manual.
- C. General Requirements for Ductwork:
 - 1. Brace rectangular ducts with cross sectional areas of 6 square feet and larger. Brace flat oval ducts in the same manner as rectangular ducts. Brace round ducts with diameters of 28 inch and larger. Brace flat oval ducts the same as rectangular ducts of the same nominal size. Exception: No bracing is required if the duct is suspended by hangers 12 inches or less in length, as measured from the top of the duct to the bottom of the support where the hanger is attached. Hangers must be positively attached to the duct within 2 inches of the top of the duct with a minimum of two #10 sheet metal screws.
 - 2. Transverse bracing shall occur at the interval specified in the tables in Chapters 5, 6, and 7 of SMACNA manual or at both ends if the duct run is less than the specified interval. Transverse bracing shall be installed at each duct turn and at each end of the duct run, with a minimum of one brace at each end.
 - 3. Longitudinal bracing shall occur at the interval specified in the tables in Chapters 5, 6 and 7 of SMACNA manual with at least one brace per duct run. Transverse bracing for one duct section connected perpendicular to it if the bracing is installed within four feet of the intersection of the ducts, and if the bracing is sized for the larger duct. Duct joints shall conform to SMACNA duct construction standards.
 - 4. A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight, and dimensions of the duct for which bracing details are selected.
 - 5. Walls, including gypsum board nonbearing partitions, which have ducts running through them may replace a typical transverse brace. Provide solid blocking around duct penetrations at stud wall construction.
 - 6. Unbraced ducts shall be installed with a 6-inch minimum clearance to vertical ceiling hanger wires.
- D. General Requirements for Piping:
 - 1. Bracing details, schedules, and notes of SMACNA manual apply to all types of pipe, conduit and all types of joints. Exception: Piping suspended by individual hangers 12

inches or less in length, as measured from the top of the pipe to the bottom of the support where the hanger is attached, need not be braced.

- 2. Brace all fuel oil piping, gas piping and compressed air piping that is 1-inch nominal diameter or larger.
- 3. Brace all piping located in boiler room, mechanical equipment rooms, and refrigeration mechanical rooms that is 1-1/4 inches nominal diameter and larger.
- 4. Brace all pipes 2-1/2 inch minimal diameter and larger.
- 5. Transverse bracing shall be at 40 feet maximum except where a lesser spacing is indicated in the tables for bracing of pipes.
- 6. Longitudinal bracing shall be at 80 feet maximum except where a lesser spacing is indicated in the tables of SMACNA manual. In pipes where thermal expansion is a consideration, an anchor point may be used as the specified longitudinal brace provided that it has a capacity equal to or greater than a longitudinal brace. The longitudinal braces and connections must be capable of resisting the additional force induced by expansion and contraction.
- 7. For all gas piping, the bracing details, schedules and notes of SMACNA manual may be used, except that transverse bracing shall be at 20 feet maximum, and longitudinal bracing shall be 40 feet maximum
- 8. Transverse bracing for one pipe section may also act as longitudinal bracing for a pipe section of the same size connected perpendicular to it if the bracing is installed within 24 inches of the elbow or tee.
- 9. Seismic braces for pipes on trapeze hangers may be used.
- 10. Provide flexibility in joints where pipes pass through building seismic joints or expansion joints where rigidly supported pipes connect to equipment with vibration isolators. For threaded piping, the flexibility may be provided by the installation of swing joints. For piping with manufactured ball joints, select the length of piping offset using seismic drift in place of the expansion given in the joint manufacturer's selection table. Seismic drift = 0.015 feet per foot of height above the base where seismic separation occurs.
- 11. Branch lines may not be used to brace main lines.
- 12. A rigid piping system shall not be braced to dissimilar parts of the building or to two dissimilar building systems that may respond differently during an earthquake.
- 13. Cast iron pipe of all types, glass pipe, and any other pipe joined with a shield and clamp assembly, where the top of the pipe is 12 inches or more from the supporting structure, shall be braced on each side of a change in direction of 90° or more. Riser joints shall be braced or stabilized between floors.
- 14. Vertical risers shall be laterally supported with a riser clamp at each floor. For buildings greater than six stories high, all risers shall be engineered individually.
- 15. Restrain risers in hubless piping systems where the riser joints are unsupported between floors.

3.06 PAINTING

- A. Coordinate with Division 9.
- B. Paint all piping, ductwork, mechanical equipment, hangers, and associated appurtenances exposed within finished spaces (except chrome plated or stainless steel). Insulated piping, ductwork, and equipment shall also apply.
- C. Paint all piping, ductwork, hangers, and associated appurtenances exposed on the outside of the building. Paint roof mounted piping, ductwork, and associated appurtenances where visible from the ground level.
- D. Paint mechanical equipment delivered to the site with prime coat.
- E. Paint mechanical equipment supplied with factory finish where indicated within the contract documents to be field finished.
- F. Paint wall mounted air registers, grilles and diffusers to match adjacent wall color or as directed by the Owner's Representative.
- G. Paint GWB ceiling mounted air registers, grilles and diffusers to match adjacent wall color or as directed by the Owner's Representative.
- H. Paint access doors to match adjacent wall or ceiling color; or as directed by the Owner's Representative.
- I. Paint piping and appurtenances exposed within casework; except chrome plated or stainless steel.
- J. Paint fabricated mechanical support systems, other than galvanized.
- K. Paint or touch-up, as directed by Owner's Representative, factory painted equipment damaged during shipment or installation.
- L. Colors as directed by Owner's Representative.

3.07 TESTING

A. Testing Requirements: The Contractor shall test systems as specified herein and as required by local code, and local authority having jurisdiction. The Contractor shall be responsible for all materials, equipment, and costs associated with testing. The Contractor shall notify the Owner's Representative with respect to testing schedules in a timely manner such that personnel may be on site to witness testing if so desired by the Owner's Representative. Scheduling of testing with the local authority having jurisdiction shall be the responsibility of the Contractor. The Contractor shall submit testing reports to the Owner's Representative.

3.08 SYSTEMS ADJUSTMENT

A. Systems shall be adjusted as necessary to ensure proper function of all controls, proper air distribution and elimination of drafts, noise and vibration. All systems shall be fully adjusted and in operating condition at substantial completion.

3.09 SYSTEMS DEMONSTRATION

- A. Notification: The Contractor shall notify and schedule demonstration of systems with the Owner's Representative such that appropriate personnel may be on site for demonstrations.
- B. Demonstration Personnel: The Contractor shall provide qualified personnel and materials on site as required to demonstrate systems.
- C. Demonstration: The Contractor shall demonstrate operation of all mechanical systems to the satisfaction of the Owner's Representative.

END OF SECTION

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SECTION 23 05 29

HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes piping, ductwork and equipment supports, hangers, anchors, bases sleeves and the sealing of work to adjacent construction.
- B. Related Sections:
 - 1. Division 3 Cast-In-Place Concrete: Execution requirements for placement of concrete housekeeping pads specified by this section.
 - 2. Section 23 07 00 Mechanical Insulation: Interface between insulation and support systems.
 - 3. Section 23 21 13 Hydronic Piping: Support of hydronic piping systems.
 - 4. Section 23 11 23 Natural Gas Piping: Support of fuel piping systems.

1.02 REFERENCES

- A. ASME B31.1 (American Society of Mechanical Engineers) Power Piping
- B. ASME B31.9 (American Society of Mechanical Engineers) Building Services Piping
- C. ASTM F708 Design and Installation of Rigid Pipe Hangers.
- D. MSS SP58 (Manufacturers Standardization Society of the Valve and Fittings Industry) Pipe Hangers and Supports Materials, Design and Manufacturer.
- E. MSS SP69 (Manufacturers Standardization Society of the Valve and Fittings Industry) Pipe Hangers and Supports Selection and Application.
- F. MSS SP89 (Manufacturers Standardization Society of the Valve and Fittings Industry) Pipe Hangers and Supports Fabrication and Installation Practices.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Submit manufacturers catalog data including load capacity.
- C. Manufacturer's Installation Instructions: Submit special procedures and assembly of components.

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1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.
- 1.05 FIELD MEASUREMENTS
 - A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

- 2.01 PIPE HANGERS AND SUPPORTS
 - A. Manufacturers:
 - 1. Grinnell.
 - 2. Michigan Hanger Co.
 - 3. Unistrut.
 - 4. Approved Equal.
 - B. Hydronic Piping:
 - 1. Conform to MSS SP58.
 - 2. Hangers for Pipe Sizes $\frac{1}{2}$ to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Cold Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
 - 4. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
 - 5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 6. Wall Support for Pipe Sizes to 3 inches: Cast iron hooks.
 - 7. Vertical Support: Steel riser clamp.
 - 8. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 9. Copper Pipe Support: Copper-plated, carbon steel ring.

2.02 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.03 INSERTS

A. 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 FLASHING

- A. Metal Flashing: 26 gauge thick galvanized steel.
- B. Metal Counterflashing: 22 gauge thick galvanized steel.
- C. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.
- D. Caps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

2.05 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gauge thick galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gauge thick galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed, refer to Section 07840.
- D. Sleeves for Round Ductwork: Galvanized steel.
- E. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- F. Fire-stopping Insulation: Glass fiber type, non-combustible; refer to Section 07840.
- G. Sealant: Acrylic; refer to Division 7.

2.06 PIPE ALIGNMENT GUIDES

A. Two-piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel.

PART 3 EXECUTION

- 3.01 INSTALLATION GENERAL
 - A. Install materials in accordance with manufacturer's instructions.

3.02 PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with MSS SP89.
- B. Support pipe hangers from building structural components.
- C. Support horizontal piping as scheduled.

- D. Install hangers to provide minimum ¹/₂ inch space between finished covering and adjacent work.
- E. Place hangers within 12 inches of each horizontal elbow.
- F. Use hangers with 1-1/2" minimum vertical adjustment.
- G. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- H. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- I. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- J. Support riser piping independently of connected horizontal piping.
- K. Provide copper plated hangers and supports for non-insulated copper piping.
- L. Design hangers for pipe movement without disengagement of supported pipe.
- M. Prime coat exposed steel hangers and supports. Hangers and supports located in pipe shafts, and suspended ceiling spaces are not considered exposed.

3.03 DUCTWORK HANGERS AND SUPPORTS

A. Support ductwork systems in accordance with SMACNA requirements.

3.04 EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 4 inches beyond supported equipment. Refer to Division 3.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members or steel pipe and fittings. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.05 FLASHING

A. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms for sound control.

3.06 SLEEVES

- A. Set sleeves in position in forms. Provide reinforcing around sleeves.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Extend sleeves through floors one inch above finished floor level. Caulk sleeves.

- D. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- E. Install chrome plated steel escutcheons at finished surfaces.

3.07 EXPANSION LOOPS AND ANCHORS

- A. Provide expansion loops as indicated on drawings.
- B. Rigidly anchor pipe to building structure where necessary. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- C. Provide support and equipment required for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where indicated.

3.08 SCHEDULES

<u>PIPE SIZE</u>	MAX. HANGER SPACING	DIAMETER
Inches	Feet	Inches
½ to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	5/8
4 to 6	10	5/8

END OF SECTION

SECTION 2	23 05	53
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MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes nameplates, tags, stencils and pipe markers.
- B. Related Sections:
 - 1. Division 09 Painting.

1.02 REFERENCES

A. ASME A13.1 (American Society of Mechanical Engineers) - Scheme for the Identification of Piping Systems.

1.03 SUBMITTALS

- A. Division 01 Administrative Requirements: Shop Drawings, Product Data and Samples.
- B. Product Data: Provide manufacturers catalog literature for each product required.
- C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 Contract Close-Out Procedures.
- B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.06 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS
 - A. Manufacturers:
 - 1. Craftmark Identification Systems.
 - 2. Safety Sign Co.
 - 3. Seton Identification Products.

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4. Approved Equal.

2.02 NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.03 TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inches diameter with smooth edges.
- C. Tag Chart: Typewritten letter size list of applied tags and location in anodized aluminum frame.

2.04 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. Piping: 3/4 inches high letters.
- B. Stencil Paint: A s specified in Division 9, semi-gloss enamel, colors and lettering size conforming to ASME A13.1.

2.05 PIPE MARKERS

- A. Color and Lettering: Conform to ASME A13.1.
- B. 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.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Division 9 for stencil painting.

3.02 INSTALLATION

- A. Apply stencil painting in accordance with Division 9.
- B. Install identifying devices after completion of coverings and painting.
- C. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- D. Install tags using corrosion resistant chain. Number tags consecutively by location.
- E. Identify air handling units, pumps and tanks with plastic nameplates. Small devices, such as inline pumps, may be identified with tags.

- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.
- H. Tag automatic controls, instruments, and relays. Key to control schematic.
- I. Identify piping located in the boiler room and fan rooms/areas with plastic pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at side of penetration of structure or enclosure, and at each obstruction.
- J. Identify piping, concealed or exposed, with plastic pipe markers or stenciled painting. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING AND BALANCING

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes testing, adjusting, and balancing of air systems, testing, adjusting, and balancing of hydronic systems, and measurement of final operating condition of HVAC systems.

1.02 REFERENCES

- A. AABC (Associated Air Balance Council) National Standards for Total System Balance.
- B. ASHRAE 111 (American Society of Heating, Refrigerating and Air-Conditioning Engineers) - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.
- C. NEBB (National Environmental Balancing Bureau) Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Test Reports: Indicate data on AABC, NEBB, or Contractors standard forms.
- C. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting and balancing of systems and equipment to achieve specified performance.
- D. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- E. Provide reports in PDF format and in hard cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 Contract closeout procedures.
- B. Project Record Documents: Record actual locations of balancing valves and rough setting.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.06 QUALIFICATIONS

A. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience certified by AABC or NEBB.

B. Perform Work under supervision of an AABC Certified Test and Balance Engineer, NEBB Certified Testing, Balancing and Adjusting Supervisor or registered professional engineer experienced in performance of this Work and licensed in the State of Alaska.

1.07 SEQUENCING

A. Sequence balancing between completion of systems tested and Date of Substantial Completion.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed, and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
 - 12. Hydronic systems are flushed, filled, and vented.
 - 13. Pumps are rotating correctly.
 - 14. Proper strainer baskets are clean and in place or in normal position.
 - 15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies noted during performance of services, which prevent system balance.

3.02 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

3.03 INSTALLATION TOLERANCES

A. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

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K+A designstudios

3.04 ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

3.05 AIR SYSTEM PROCEDURE

- A. Provide written record with required and actual air quantities recorded at each fan.
- B. Adjust outside air automatic dampers, outside air, return air and exhaust dampers for design conditions.
- C. Measure temperature conditions across outside air, return air and exhaust dampers to check leakage.
- D. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum airflow rate, full cooling, and at minimum airflow rate, full heating.

3.06 WATER SYSTEM PROCEDURE

- A. Adjust water systems, after air balancing, to provide design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow-metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Adjust systems to provide specified flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open or in normal position to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing valves. Do not use service or shut-off valves for balancing.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.
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3.07 SCHEDULES

Equipment Requiring Testing, Adjusting, and Balancing

- Plumbing Pumps
- HVAC Pumps
- Terminal Heat Transfer Units
- Radiant Heat Manifolds
- Snowmelt Heat Manifolds
- Fans
 - A. Report Forms
 - 1. Title Page:
 - a) Name of Testing, Adjusting, and Balancing Agency
 - b) Address of Testing, Adjusting, and Balancing Agency
 - c) Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
 - d) Project name
 - e) Project location
 - f) Project Architect
 - g) Project Engineer
 - h) Project Contractor
 - i) Project altitude
 - j) Report date
 - 2. Summary Comments:
 - a) Design versus final performance
 - b) Notable characteristics of system
 - c) Description of systems operation sequence
 - d) Summary of outdoor and exhaust flows to indicate amount of building pressurization
 - e) Nomenclature used throughout report
 - f) Test conditions
 - 3. Instrument List:
 - a) Instrument
 - b) Manufacturer
 - c) Model number

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- d) Serial number
- e) Range
- f) Calibration date
- 4. Electric Motors:
 - a) Manufacturer
 - b) Model/Frame
 - c) HP/BHP and kW
 - d) Phase, voltage, amperage; nameplate, actual, no load
 - e) RPM
 - f) Service factor
 - g) Starter size, rating, heater elements
 - h) Sheave Make/Size/Bore
- 5. Pump Data:
 - a) Identification/number
 - b) Manufacturer
 - c) Size/model
 - d) Impeller
 - e) Service
 - f) Design flow rate, pressure drop, BHP and kW
 - g) Actual flow rate, pressure drop, BHP and kW
 - h) Discharge pressure
 - i) Suction pressure
 - j) Total operating head pressure
 - k) Shut off, discharge and suction pressures
 - I) Shut off, total head pressure
- 6. Terminal Heating Unit:
 - a) Identification/number
 - b) Location
 - c) Service

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- d) Manufacturer
- e) Model number
- f) Serial number
- g) Heating water entering temperature, design and actual
- h) Heating water leaving temperature, design and actual
- i) Heating water flow, design and actual
- j) Heating water pressure drop, design and actual
- 7. Radiant Heat Manifold:
 - a) Identification/number
 - b) Location
 - c) Service
 - d) Heating water entering temperature, design and actual
 - e) Heating water leaving temperature, design and actual
 - f) Heating water flow, design and actual
 - g) Heating water pressure drop, design and actual
- 8. Fan Data:
 - a) Location
 - b) Manufacturer
 - c) Model number
 - d) Serial number
 - e) Air flow, specified and actual

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MECHANICAL INSULATION

SECTION 23 07 00 PART 1 GENERAL

1.01 SUMMARY

- A. Section includes ductwork insulation, duct liner, insulation jackets, equipment insulation, covering, thermal insulation for piping systems including vapor retarders, jackets and accessories.
- B. Related Sections:
 - 1. Division 09 Painting: Execution requirements for painting insulation jackets and covering specified by this section.
 - 2. Section 23 05 29 Hangers and Supports: Execution requirements for inserts for placement by this section.
 - 3. Section 23 05 53 Mechanical Identification: Product requirements for mechanical identification for placement by this section.

1.02 REFERENCES

- A. ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus.
- C. ASTM C195 Standard Specification for Mineral Fiber Thermal Insulating Cement.
- D. ASTM C449/C449M Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
- E. ASTM C518 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- F. ASTM C533 Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
- G. ASTM C534 Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- H. ASTM C547 Standard Specification for Mineral Fiber Preformed Pipe Insulation.
- I. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- J. ASTM C592 Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type).
- K. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- L. ASTM C1071 Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).

- M. ASTM C1126- Standard Specification for Preformed Closed Cell Phenolic Foam Pipe and Board Insulation.
- N. ASTM C1136 Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
- O. ASTM D1784 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- P. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- Q. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
- R. ASTM E162 Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
- S. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- T. NAIMA (North American Insulation Manufacturers Association) National Insulation Standards.
- U. SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) HVAC Duct Construction Standards Metal and Flexible.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Provide product description, thermal characteristics and list of materials and thickness for each service, and locations.
- C. Manufacturer's Installation Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install insulation outside ambient conditions required by manufacturer of each product.

- B. Maintain temperature during and after installation for minimum period of 24 hours.
- 1.07 FIELD MEASUREMENTS
 - A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS
 - A. Manufacturers:
 - 1. Owens Corning.
 - 2. Certain Teed.
 - 3. Knauf.
 - 4. Armstrong.
 - 5. Johns Manville.
 - 6. Approved Equal.

2.02 MINERAL FIBER PIPE INSULATION

- A. Insulation: ASTM C547 Mineral Fiber Pipe Insulation, Type I 850(454).
- B. Vapor Retarder Jacket:
 - 1. White Kraft paper with glass fiber yarn, bonded to aluminized film.
 - 2. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.
- C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- D. Vapor Retarder Lap Adhesive: Compatible with insulation.
- E. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- F. Insulating Cement: ASTM C449/C449M.
- 2.03 ELASTOMERIC CELLULAR FOAM PIPE INSULATION
 - A. Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular form: ASTM C534; Type I, Tubular form.
 - B. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
- 2.04 HYDROUS CALCIUM SILICATE INSULATION
 - A. Calcium Silicate Block and Pipe Thermal Insulation: ASTM C533, Type I for use on surfaces up to 1,200°F.

- B. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- C. Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement: ASTM C449/C449M.
- 2.05 MINERAL FIBER, FLEXIBLE Insulation for the exterior of sheet metal ducts
 - A. Insulation: ASTM C553 Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications, Type II.
 - B. Vapor Retarder Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture vapor transmission: ASTM E96; 0.02 perm.
 - 3. Secure with pressure sensitive tape.
 - C. Vapor Retarder Tape: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
 - D. Tie Wire: Annealed steel, 16 gage.
- 2.06 MINERAL FIBER, RIGID Insulation for the exterior of sheet metal ducts.
 - A. Insulation: ASTM C612 Mineral Fiber Block and Board Insulation, Type IA
 - B. Indoor Vapor Retarder Finish: Canvas Jacket with vapor retardant finish.
- 2.07 GLASS FIBER DUCT LINER Board Insulation for the interior of sheet metal ducts.
 - A. Insulation: ASTM C1071 Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material), Type II. Surface acrylic coating containing EPA registered biocide.
 - B. Adhesive: Waterproof, ASTM E162 fire-retardant type.
 - C. Liner Fasteners: Galvanized steel, impact applied or welded.
- 2.08 GLASS FIBER ROUND DUCT LINER
 - A. Insulation: Round, preformed in cylindrical sections with surface acrylic coating containing EPA registered biocide. Finish with interior perforated metal liner.
 - 1. 'K' factor: ASTM C1071, Type II, 0.23 at 75°F.
 - 2. Maximum service temperature: 250°F.
 - 3. Maximum Velocity on Coated Air Side: 4,000 fpm.

2.09 INSULATION JACKETS

- A. Pipe Fitting Jacket: ASTM D1784, One piece molded type fitting covers, off-white color.
 - 1. Connections: Pressure sensitive color matching vinyl tape.

- B. Canvas Jacket: UL listed.
 - 1. Fabric: 6 oz/sq. yd., plain weave cotton.
 - 2. Fire retardant lagging adhesive. Composite of insulation, jacket and lagging adhesive shall have a flame spread index not greater than 25 and a smoke developed index not greater than 50 per ASTM E84.
 - 3. Lagging Adhesive: Compatible with insulation.
- C. Stainless Steel Jacket: ASTM A167 Type 302 stainless steel.
 - 1. Thickness: 0.016 inch thick.
 - 2. Finish: Corrugated.
 - 3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Division 01 Administrative Requirements: Coordination and project conditions.
- B. Verify that piping, equipment and ductwork has been tested before applying insulation materials.
- C. Verify that surfaces are clean and dry, with foreign material removed.
- 3.02 INSTALLATION GENERAL
 - A. Install in accordance with NAIMA National Insulation Standards.

3.03 INSTALLATION - PIPING

- A. Exposed Piping: Locate insulation and cover seams in least visible locations.
- B. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, and strainers.
- C. Mineral fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal all staple penetrations with vapor retarder mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with PVC fitting covers.
- D. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

- E. Mineral fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or the pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with PVC fitting covers.
- F. Inserts and Shields:
 - 1. Application: Piping or Equipment 1-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert material: Compression resistant insulating material suitable for the planned temperature range and service.
- G. Continue insulation through penetrations of building assemblies or portions of assemblies having a fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions. Division 07 for penetrations of assemblies with a fire resistance rating greater than one hour.
- H. Pipe exposed in mechanical equipment rooms and vehicle bays 12' from floor: Finish with canvas jacket
- I. Pump Engine Exhaust Insulation: Insulate exhaust piping from engine flexible connection to exterior wall penetration. Finish with canvas aluminum jacket.

3.04 INSTALLATION – DUCTWORK

- A. Insulated ductwork conveying air below ambient temperature:
 - 1. Provide insulation with vapor retarder jackets.
 - 2. Finish with tape and vapor retarder jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system including fittings, joints, and flanges.
- B. Insulated ductwork conveying air above ambient temperature:
 - 1. Provide with or without standard vapor retarder jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- C. Ductwork exposed in mechanical equipment rooms and vehicle bays 12' from floor: Finish with canvas jacket.

- D. External Duct Insulation Application:
 - 1. Secure insulation with vapor retarder with wires and seal jacket joints with vapor retarder adhesive or tape to match jacket.
 - 2. Secure insulation without vapor retarder with staples, tape, or wires.
 - 3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
 - 4. Seal vapor retarder penetrations by mechanical fasteners with vapor retarder adhesive.
 - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- E. Duct Liner Application:
 - 1. Adhere insulation with adhesive for 100 percent coverage.
 - 2. Secure insulation with mechanical liner fasteners. SMACNA Standards for spacing.
 - 3. Seal and smooth joints. Seal and coat transverse joints.
 - 4. Seal liner surface penetrations with adhesive.
 - 5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

3.05 PIPING INSULATION SCHEDULE

A. Glass Fiber Insulation Schedule:

Piping Systems	Pipe Size	<u>Thickness</u>
Heating Water/Glycol Supply	All	1-1/2"
Heating Water/Glycol Return	All	1-1/2"

B. Hydrous Calcium Silicate Insulation Schedule

Piping Systems	Pipe Size	Thickness
Engine Generator Exhaust	All	2"

Β.

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3.06 DUCTWORK INSULATION SCHEDULE

A. Flexible Glass Fiber Duct Wrap Insulation Schedule:

Ductwork	Thickness	Finish
Round Exhaust Ducts	2"	Aluminized Film
Outside Air Ductwork	2"	Canvas
Combustion Air Ductwork	2"	Canvas
Relief Air Ductwork	2"	Canvas
Exhaust Ducts	2"	Aluminized Film
Flexible Glass Fiber Duct Liner Insulation Schedule:		
Dustural	Thiskness	

Ductwork	l hickness
Where Indicated On Plans	1"

SECTION 23 09 00 INSTRUMENTATION AND CONTROL ELEMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes thermostats, control valves, automatic dampers, damper operators, and miscellaneous accessories.
- B. Related Sections:
 - 1. Section 23 00 00 Basic Mechanical Requirements.
 - 2. Section 23 21 13 Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, gage taps.
 - 3. Section 23 31 00 Ducts: Installation of automatic dampers.
 - 4. Section 23 09 23 Controls and Sequence of Operations.
 - 5. Division 26 Electrical.

1.02 REFERENCES

- A. AMCA 500 Test Methods for Louvers, Dampers and Shutters.
- B. NEMA DC 3 Low-Voltage Room Thermostats.
- C. NFPA 70 National Electrical Code.
- D. NFPA 90A Installation of Air Conditioning and Ventilation Systems.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.
- D. Manufacturer's Instructions: Provide for all manufactured components.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 Contract closeout procedures.
- B. Project Record Documents: Record actual locations of control components, including thermostats and sensors.
- C. Revise shop drawings to reflect actual installation and operating sequences.

- D. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials and calibration tolerances.
- E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owners name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and factory trained by manufacturer

1.06 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 WARRANTY

- A. Division 01 Warranties and Bonds.
- B. Correct defective Work within a one-year period after Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens.

2.02 CONTROL VALVES

- A. Globe Pattern:
 - 1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends.
 - 2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
 - 3. Hydronic Systems:
 - a) Rate for service pressure of 125 psig at 250 degrees F.
 - b) Replaceable plugs and seats of brass.
 - c) Size for 3 psig maximum pressure drop at design flow rate.
 - d) Two-way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two-way valve operators to close valves against pump shut off head.

- B. Electronic Operators:
 - 1. Valves shall spring return to normal position (full heat).
 - 2. Select operator for full shut off at maximum pump differential pressure.
- C. Radiation Valves:
 - 1. Bronze body, bronze trim, 2 or 3 port as indicated, replaceable plugs and seats, union and threaded ends.
 - 2. Rate for service pressure of 125 psig at 250 degrees F.
 - 3. Size for 3 psig maximum pressure drop at design flow rate.
 - Two-way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two-way valve operators to close valves against pump shut off head.
 - 5. Operators (Modulating): Self contained, linear motorized actuator with approximately 3/4 inch stroke, 60 second full travel with transformer and SPDT contacts: 24 v DC, 6 watt maximum input.

2.03 CONTROL DAMPERS

- A. Performance: Test in accordance with AMCA 500.
- B. Frames: Extruded aluminum, welded or riveted with corner reinforcement, minimum 12 gage.
- C. Blades: Extruded aluminum, maximum blade size 6 inches wide, 48 inches long, minimum 22 gage, attached to minimum 1/2 inch shafts with set screws.
- D. Blade Seals: Extruded vinyl for –50 degrees to 250 degrees operation, field replaceable.
- E. Jamb Seals: Spring stainless steel.
- F. Shaft Bearings: Graphite impregnated nylon sleeve, with thrust washers at bearings.
- G. Linkage Bearings: Graphite impregnated nylon.
- H. Leakage: Less than 6 cfm/sq. ft. at 4" wg.
- I. Temperature Limits: -50°F to 250°F.

2.04 DAMPER OPERATORS

- A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
- B. Electric Operators:
 - 1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.

C. Number: Sufficient to achieve unrestricted movement throughout damper range. Provide one damper operator for maximum 36 sq. ft damper section.

2.05 INPUT/OUTPUT SENSORS

- A. Temperature:
 - 1. Resistance temperature detectors with resistance tolerance of plus or minus 0.1 percent at 70 degrees F, interchangeability less than plus or minus 0.2 percent, time constant of 13 seconds maximum for fluids and 200 seconds maximum for air.
 - 2. Measuring current maximum 5 mA with maximum self-heat of 0.031°F/mW in fluids and 0.014°F/mW in air.
 - 3. Provide 3 lead wires and shield for input bridge circuit.
 - 4. Use insertion elements in ducts not affected by temperature stratification or smaller than one square meter. Use averaging elements where larger or prone to stratification sensor length 8 feet or 16 feet as required.
 - 5. Insertion elements for liquids shall be with brass socket with minimum insertion length of 2-1/2 inches.
 - 6. Room sensors: Locking cover.
 - 7. Outside air sensors: Watertight inlet fitting, shielded from direct rays of sun.
- B. Static Pressure Sensors:
 - 1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
 - 2. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40°F to 100°F.
 - 3. Accuracy: One percent of full scale with repeatability 0.3 percent.
 - 4. Output: 0 5 vdc with power at 12 to 28 vdc.
- C. Equipment Operation Sensors:
 - 1. Status Inputs for Fans: Differential pressure switch with adjustable range of 0" to 5" wg.
 - 2. Status Inputs for Pumps: Differential pressure switch piped across pump with adjustable pressure differential range of 8 to 60 psi.
 - 3. Status Inputs for Electric Motors: Current sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.
- D. Damper Position Indication: Potentiometer mounted in enclosure with adjustable crank arm assembly connected to damper to transmit 0 100 percent damper travel.

2.06 THERMOSTATS

- A. Electric Room Thermostats:
 - 1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.

- 2. Service: heating only or cooling and heating as required.
- 3. Covers: Locking with set point adjustment, setpoint indication, with thermometer.
- B. Line Voltage Thermostats:
 - 1. Integral manual On/Off/Auto selector switch, single or two pole as required.
 - 2. Dead band: Maximum 2°F.
 - 3. Cover: Locking with set point adjustment, setpoint indication, with thermometer.
 - 4. Rating: Motor load.
- C. Room Thermostat Accessories:
 - 1. Insulating Bases: For thermostats located on exterior walls.
 - 2. Adjusting Key: As required for device.
 - 3. Thermostat Guards: Locking transparent plastic mounted on separate base.
- D. Immersion Thermostat:
 - 1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint and adjustable throttling range.
- E. Airstream Thermostats:
 - 1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint in middle of range and adjustable throttling range.
 - 2. Averaging service remote bulb element: Length as required.
- F. Electric Low Limit Duct Thermostat:
 - 1. Snap acting, single pole, single throw, manual reset switch which trips if temperature sensed across any 12" of bulb length is equal to or below setpoint.
 - 2. Bulb length: Minimum 20 feet.
 - 3. Provide one thermostat for every 20 sq. ft of coil surface.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Verify that systems are ready to receive work.
 - B. Beginning of installation means installer accepts existing conditions.
 - C. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

- D. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- E. Ensure installation components is complementary to installation of similar components.
- F. Coordinate installation of system components with installation of mechanical systems equipment.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats and other exposed control sensors with plans and room details before installation. Locate 48 inches above floor. Align with lighting switches.
- C. Mount freeze protection thermostats using flanges and element holders.
- D. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.
- E. Provide separable sockets for liquids and flanges for air bulb elements.
- F. Provide valves with position indicators where sequenced with other controls.
- G. Provide mixing dampers of parallel blade construction arranged to mix streams.
- H. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.
- I. Provide conduit and electrical wiring in accordance with Division 26. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.
- J. Systems operation instruction and training shall occur per Division 01 within one week after substantial completion with Owner's representative on site.

SECTION 23 09 23 CONTROLS AND SEQUENCE OF OPERATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Sequence of operation:
 - 1. Exhaust Fan Systems.
 - 2. Energy Recovery Ventilator Systems.
 - 3. Hydronic Pump Systems.
 - 4. Snowmelt Systems.
 - 5. Radiant Systems.
 - 6. Unit heaters.
 - 7. Domestic Hot Water Generator Systems.
 - 8. Domestic Hot Water Circulation Systems.
- B. Related Sections:
 - 1. Section 22 09 00 Instrumentation and Control Elements.
 - 2. Division 26.

1.02 SYSTEM DESCRIPTION

- A. Provide a complete and operational DDC type control system as required to provide equipment control as specified within this Section.
- B. This Section defines the manner and method by which controls function. Requirements for each type of control system operation are specified.

1.03 SUBMITTALS

- A. Division 1 Administrative Requirements.
- 1.04 CLOSEOUT SUBMITTALS
 - A. Division 1 Closeout Submittals.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

- 3.01 DOMESTIC WATER GENERATORS (HWG-1 AND HWG-2) AND PUMP (CP-1)
 - A. Operation Mode:

- 1. Hot water generator shall operate continuously.
- 2. Hot water generator Integral controls shall modulate control valve and pump, <u>CP-1</u>, to maintain aquastat setting of 120° F (adjustable).

3.02 BOILER CIRCULATION WATER PUMP SYSTEMS (CP-2)

- A. Operation Mode:
 - 1. Pump system shall be enabled when the outside air temperature is less than 60° F (adjustable) and when any radiant zone is calling for heat.
 - 2. Pump system shall be disabled when the outside air temperature is 60° F or more (adjustable).
- B. Pump Operation:
 - 1. Pump shall run when enabled.
- 3.03 SNOWMELT SYSTEMS (CP-3 AND CP-4)
 - A. Operation Mode:
 - 1. Packaged snow/ice sensor and snow melting controller system. Tekmar or equal.
- 3.04 RADIANT HEAT SYSTEM PUMPS (CP-5 AND CP-6)
 - A. Operation Mode:
 - 1. Pumps shall be controlled through packaged radiant heat controller system. Tekmar or equal.

3.05 DOMESTIC HOT WATER CIRCULATION PUMP (CP-7)

- A. Operation Mode:
 - 1. Pump shall run continuously.
 - 2. Pump shall be manually controlled by two position on/off wall switch.
 - 3.
- 3.06 BOILER SYSTEMS (B-1 AND B-2)
 - A. Operation Mode:
 - 1. Boilers shall be manually enabled and disabled by manual disconnect.
 - 2.
 - Burner Firing Control:
 - 1. Burner firing control shall be by boiler manufacturer.

3.07 UNIT HEATERS

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A. Operation Mode:

- 1. Low voltage space thermostat maintains room set point by cycling unit's fan motor.
- 3.08 RADIANT ZONES
 - A. Operation Mode:
 - 1. Control valve shall modulate to maintain space setpoint (adjustable).
- 3.09 EXHAUST FANS (EF-1 through EF-7)
 - A. Operation Mode:
 - 1. On-Off control via local wall switch.
- 3.10 ENERGY RECOVERY VENTILATOR (ERV-1)
 - A. Operation Mode:
 - 1. On-Off control via local wall switch.

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SECTION 23 11 23

NATURAL GAS PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes piping, fittings and valves for gas piping systems.
- B. Related Sections:
 - 1. Division 09 Painting: Product requirements for painting for placement by this section.
 - 2. Section 23 05 53 Mechanical Identification: Product requirements for valve and pipe identification for placement by this section.

1.02 REFERENCES

- A. ASME SEC IX (American Society of Mechanical Engineers) Welding and Brazing Qualifications.
- B. ASME B16.3 (American Society of Mechanical Engineers) Malleable Iron Threaded Fittings.
- C. ASTM A53 Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- D. ASTM A234/A234M Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- E. NFPA 54 (National Fire Protection Association) National Fuel Gas Code.
- F. 2012 International Fuel Gas Code (IFGC).

1.03 SUBMITTALS

- A. Division 01 Contract Close-Out Procedures.
- B. Submittal Requirements: In addition to submittal procedures as outlined under Division 1, mechanical submittals shall be submitted as follows:
 - 1. Product Data: Submit data on pipe materials, pipe fittings, valves and accessories.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 Closeout Submittals.
- B. Contract Closeout Requirements: In addition to contract closeout requirements as outlined under Division 1, mechanical contract closeout requirements shall include the following:
 - 1. Project Record Documents: Record actual locations of valves, piping system and system components.
 - 2. Operation and Maintenance Data: Submit installation instructions, spare parts lists.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with NFPA 54.
- 1.06 QUALIFICATIONS
 - A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
 - B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation. Provide temporary protective coating on cast iron and steel valves.

1.08 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.09 WARRANTY

- A. Division 01 Warranties and Bonds.
- B. Provide one-year manufacturer warranty for pumps and valves excluding packing.

PART 2 Products

- 2.01 NATURAL GAS PIPING ABOVE GRADE
 - A. Steel Pipe: ASTM A53 Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M forged steel welding type.
 - 2. Joints: NFPA 54, threaded or welded for low pressure; welded for medium pressure.

2.02 FLANGES, UNIONS AND COUPLINGS

- A. Pipe Size 2 inches and Under:
 - 1. Ferrous pipe: 150-psi malleable iron threaded unions.
- B. Pipe Size Over 2 inches:
 - 1. Ferrous pipe: 150 psi forged steel slip-on flanges; 1/16" thick preformed neoprene gaskets.

2.03 BALL VALVES

A. Manufacturers:

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- 1. Crane.
- 2. Milwaukee.
- 3. Nibco.
- 4. Approved Equal.
- B. MSS SP-110, Class 150, 400 psi CWP, bronze, two-piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded ends, rated for natural gas service.
- 2.04 SEISMIC SHUT-OFF VALVES
 - A. Manufacturers:
 - 1. Koso.
 - 2. Approved Equal.
 - B. ASCE 25-97, UL listed, flanged, positive closure, soft seal seating, visual open-close indicator, manual reset and vertical installation with bottom inlet.
 - C. The valve shall be capable of closing within five seconds when subjected to a horizontal, sinusoidal oscillation with the following characteristics:

Peek Acceleration	Period
0.7G	0.13 Seconds
0.4G	0.20 Seconds
0.3G	0.4 Seconds
0.25G	1.00 Seconds

D. The valve shall not close with subjected for five seconds to each of the three horizontal, sinusoidal oscillations with the following characteristics:

Peek Acceleration	Period
0.4G	0.10 Seconds
0.2G	0.20 Seconds
0.15G	0.40 Seconds
0.10G	1.00 Seconds

PART 3 Execution

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

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3.02 INSTALLATION

- A. Route piping in orderly manner and maintain gradient.
- B. Install piping to conserve building space and not interfere with use of space.
- C. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Division 08.
- F. Provide support for utility meters in accordance with requirements of utility companies.
- G. Pipe vents from gas pressure reducing valves to outdoors and terminate in weatherproof hood.
- H. Install valves with stems upright or horizontal, not inverted.
- I. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work and isolating parts of completed system.
- J. Provide new gas service complete with gas meter and regulators. The gas service distribution piping shall have initial minimum pressure of 7"w.g. Provide regulators on each line serving gravity type appliances, sized in accordance with equipment. Route vent piping as required from regulators to approved location outside the building.

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SECTION 23 12 16

FUEL DISPENSING SYSTEMS

PART 1 General

1.01 SUMMARY

- A. Section includes piping, fittings, valves, diesel fuel pumps, gasoline fuel pumps and tanks for fuel dispensing systems.
- B. Related Sections:
 - 1. Division 09 Painting: Product requirements for painting for placement by this section.

1.02 REFERENCE

- A. API 650 (American Petroleum Institute) Welded Steel Tanks for Oil Storage.
- B. API 2000 (American Petroleum Institute) Venting Atmospheric and Low-Pressure Storage Tanks.
- C. UL 142 (Underwriters Laboratories, Inc.) Steel Aboveground Tanks for Flammable and Combustible Liquids.
- D. UL 2085 (Underwriters Laboratories, Inc.) Protected Aboveground Tanks for Flammable and Combustible Liquids.
- E. NFPA 30 (National Fire Protection Association) Flammable and Combustible Liquids.
- F. NFPA 30A (National Fire Protection Association) Automotive and Marine Service Station Code.
- G. 2014 National Electric Code (NEC).
- H. 2012 International Fire Code (IFC).

1.03 SUBMITTALS

- A. Division 01 Contract Close-Out Procedures.
- B. Submittal Requirements: In addition to submittal procedures as outlined under Division 1, mechanical submittals shall be submitted as follows:
 - 1. Shop Drawings: Provide side view and end views, indicate tank dimensions, overall dimensions with accessories and accessories layout including manholes and hold down straps.
 - 2. Product Data: Submit data on tank and pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
 - 3. Manufacturer's Installation Instructions: Submit pump data.
 - 4. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Division 01 Contract Close-out Procedures.
- B. Contract Closeout Requirements: In addition to contract closeout requirements as outlined under Division 1, mechanical contract closeout requirements shall include the following:
 - 1. Operation and Maintenance Data: Submit installation instructions, spare parts lists.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years' experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years' experience.
- 1.06 DELIVERY, STORAGE AND HANDLING
 - A. Division 1 Storage and Protection.
 - B. Accept tank and accessories on site in shipping containers with labeling in place. Inspect for damage.
 - C. Protect tank and accessories from soil, debris and physical damage. Maintain in place until installation.

PART 2 Products

- 2.01 ABOVEGROUND FUEL DISPENSING STORAGE TANKS
 - A. Manufacturers:
 - 1. AceTank and Fueling Equipment.
 - 2. Anchorage Tank.
 - 3. Greer Tanks.
 - 4. Approved Equal.
 - B. Provide complete operating fuel dispensing systems.
 - C. Tank: UL 142 and UL 2085, welded steel, double wall, 10 gauge for primary tank, 6 gauge for secondary tank, taps for accessories, threaded electrically isolated connections with striker plates below each opening. Factory applied epoxy paint and urethane paint finish. Label tank as required by UL and drawings. Size as indicated on drawings.
 - D. Openings: As indicated on drawings and as required for accessories.
 - E. Insulation: ASTM C-332 and ASTM C-495, 3" annular space insulation, Portland cement/perlite, cement grade mix. Leave 1" air gap between perlite and secondary tank interstitial space.

- F. Fill Containment: 7.5 gallon spill containment basin with lockable hinged cover. Manufactured by EBW or approved equal.
- G. Overfill Alarm: Provide a mechanical, audible overfill alarm. Ventalarm Signal approved equal.
- H. Automatic Shut-Off Device: Provide a positive closing, mechanical, automatic shut-off device. Clay & Bailey model F-30 or approved equal.
- I. Tank-Mounted Mechanical Fuel Gauge: Provide mechanical gauge with 12-hours clock face in feet and inches readout, activated by stainless steel float connected to a stainless steel cable. Morrison Model 818 or approved equal
- J. Electric Dispensing System: Provide an electric suction or submerged turbine pump with a delivery rate up to 18 gpm, 3-wheel, meter-register with reset and non-resettable 6 digit master totalizer in a cabinet, anti-siphon valve with internal pressure relief, gate valve, canister style fuel filter, flow meter, 20ft fuel hose with swivel and breakaway coupling, hose retractor, OPW 11-A automatic nozzle with lockable nozzle holder, explosion proof pump activation switch, emergency pump shutoff switch mounted on the SRE building, warning signs, and BC fire extinguisher per International Fire Code (IFC) chapter 22.
- K. Fuel Nozzle Lockbox Lock: Lockbox lock shall be a Best Locks or equal restricted keyway padlock with a shackle that is 3/8 inch in diameter having a closed clearance of 2-1/4 inches. The lock shall have a control key removable core and a separate replacement core. Provide 4 keys and 2 core-removal keys.
- L. Access Ladder.
- M. Fuel for tank 1: No. 1 diesel
- N. Fuel for tank 2: Gasoline.

PART 3 Execution

- 3.01 FUEL TANK INSTALLATION
 - A. Clean and flush aboveground tanks after installation. Seal until pipe connections are made.
 - B. Install according to the International Fire Code (IFC) chapters 22 and 34 for the type of tank specified. Mount and secure the tank on the skid base.
 - C. Label with hazard identification signs according to the International Fire Code (IFC) chapters 27 for the specific fuel contained.
 - D. Install dispensing system to include all fittings and hose.
 - E. Install wiring of the pump, emergency shut off and any other electrical items according to NFPA 30 and the National Electrical Code for hazardous locations.

- F. Place tank at the location shown on the Plans.
- G. Set automatic shut-off device to 90% capacity and fill with specified fuel at Project turnover.

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SECTION 23 21 13

HYDRONIC PIPING

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes systems, accessories, valves, pipe and pipe fittings for glycol heating and water heating.
 - B. Related Sections:
 - Division 08 Access Doors: Product requirements for access doors for placement by this section.
 - 2. Division 09 Painting.
 - 3. Section 23 07 00 Mechanical Insulation: Product requirements for piping insulation for placement by this section.

1.02 REFERENCES

- A. ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Codes, SEC IX - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
- B. ASME B31.9 (American Society of Mechanical Engineers) Building Services Piping.
- C. ASME B16.18 (American Society of Mechanical Engineers) Cast Copper Alloy Solder Joint Pressure Fittings.
- D. ASME B16.22 (American Society of Mechanical Engineers) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- E. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- F. ASTM A234 Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- G. ASTM B32 Solder Metal.
- H. ASTM B88 Seamless Copper Water Tube.
- I. ASTM F876 Crosslinked Polyethylene (PEX) Tubing.
- J. AWS D1.1 (American Welding Society) Structural Welding Code.

1.03 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

- B. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Use non-conducting dielectric nipple or flange connections or bronze union whenever jointing dissimilar metals in systems. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- C. Use ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Use ball valves for throttling or bypass services.
- E. Use ³/₄-inch ball valves with hose connection end and cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
- F. Valve seat materials shall be compatible with glycol solutions applicable to this project.

1.04 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Shop Drawings: Snowmelt and radiant tubing system layout prepared by tubing manufacturer's authorized representative.
- C. Product Data: Submit data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- D. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures and isolation.
- E. Welders' Certificate: Include welders' certification of compliance with ASME/SEC 9.

1.05 CLOSEOUT SUBMITTALS

- A. Division 01 Contract closeout procedures.
- B. Project Record Documents: Record actual locations of valves.
- C. Operation and Maintenance Data: Submit instructions for installation and changing components, spare parts lists, exploded assembly views.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME SEC IX for welding materials and procedures.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Fabricator or Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- 1.08 DELIVERY, STORAGE, AND HANDLING
 - A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system Protect.
- 1.09 FIELD MEASUREMENTS
 - A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Division 1 Warranties and Bonds.
- B. Provide one-year manufacturer warranty for valves excluding packing.

PART 2 PRODUCTS

- 2.01 GLYCOL AND WATER HEATING PIPING, ABOVEGROUND
 - A. Steel Pipe: ASTM A53, Schedule 40, black. Allowed for 4" and larger piping only.
 - 1. Fittings: ASTM A234, forged steel welding type fittings.
 - 2. Joints: AWS D1.1, welded.
 - B. Copper Tubing: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
 - 2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535°F.

2.02 RADIANT TUBING

- A. Polyethylene Pipe: ASTM F876, cross-linked polyethylene (PEX) with oxygen diffusion barrier.
 - 1. Manifolds: Copper construction, with allowances for tube connections, tube balancing, drains, air vents, and additional appurtenances as recommended by tubing manufacturer.
 - 2. Fittings: Brass and copper.
 - 3. Joints: Mechanical compression fittings.
- B. Tubing Layout and Arrangement: Tubing manufacturer's authorized representative shall design, and layout in-slab tubing system and detailed installation requirements as scheduled and in accordance with tubing manufacturer requirements.
- C. Radiant System Controller: Tekmar controller for modulation of injector pump and cycling of radiant system pump.
- 2.03 SNOWMELT TUBING

- A. Polyethylene Pipe: ASTM F876, cross-linked polyethylene (PEX) with oxygen diffusion barrier.
 - 1. Manifolds: Copper construction, with allowances for tube connections, tube balancing, drains, air vents, and additional appurtenances as recommended by tubing manufacturer.
 - 2. Fittings: Brass and copper.
 - 3. Joints: Mechanical compression fittings.
- B. Tubing Layout and Arrangement: Tubing manufacturer's authorized representative shall design, and layout in-slab tubing system and detailed installation requirements as scheduled and in accordance with tubing manufacturer requirements.
- C. Snowmelt System Controller: Tekmar controller with snow/slab temperature sensor for modulation of injector pump and cycling of snowmelt system pump.
- 2.04 EQUIPMENT DRAINS AND OVERFLOWS
 - A. Copper Tubing: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
 - 2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535°F.
- 2.05 UNIONS, FLANGES, AND COUPLINGS
 - A. Unions for Pipe 2 inches and Under:
 - 1. Ferrous Piping: 150 psig malleable iron, threaded.
 - 2. Copper Pipe: Bronze, soldered joints.
 - B. Flanges for Pipe Over 2 inches:
 - 1. Ferrous Piping: 150 psig forged steel, slip-on.
 - 2. Copper Piping: Bronze.
 - 3. Gaskets: 1/16 inch thick preformed neoprene.
 - C. Dielectric Connections: Non-conducting dielectric nipple or flange connections or bronze union whenever jointing dissimilar metals in systems.

2.06 BALL VALVES

- A. Manufacturers:
 - 1. Crane.
 - 2. Milwaukee.
 - 3. Nibco.

- 4. Approved Equal.
- B. Up to and including 2 inches: Bronze two piece body, chrome plated brass or stainless steel ball, teflon seats and stuffing box ring, lever handle, solder or threaded ends.
- C. Over 2 inches: Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle, flanged.

2.07 GATE VALVE AND BUTTERFLY VALVES

A. Not allowed.

2.08 SWING CHECK VALVES

- A. Manufacturers:
 - 1. Crane.
 - 2. Milwaukee.
 - 3. Nibco.
 - 4. Approved Equal.
- B. Up to and including 2 inches: Bronze body and trim, bronze rotating swing disc, with composition disc, solder or threaded ends.
- C. Over 2 inches: Iron body, bronze trim, bronze or bronze faced rotating swing disc, renewable disc and seat, flanged ends.

2.09 SYSTEM CLEANER

A. Product Description: Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products: sodium tri-poly phosphate.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. Operate, fill, start and vent systems prior to cleaning. Use the water meter to record capacity in each system. Place terminal control valves in open during cleaning.

3.02 CLEANING

A. Concentration:

- 1. As recommended by manufacturer.
- B. Hot Water Heating Systems:
 - 1. Apply heat while circulating, slowly raising temperature to 195°F and maintain for 12 hours minimum.
 - 2. Remove heat and circulate to 100°F or less; drain systems as quickly as possible and refill with clean water.
 - 3. Circulate for 6 hours at design temperatures, then drain.
 - 4. Refill with clean water and repeat until system cleaner is removed.
 - 5. Remove, clean, and replace strainer screens.
 - 6. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.03 INSTALLATION

- A. Install glycol and water heating piping in conformance with ASME B31.9.
- B. Route piping parallel to building structure and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Sleeve pipe passing through partitions, walls and floors.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Division 08.
- H. Slope piping and arrange systems to drain at low points.
- I. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. Refer to Division 09.
- J. Install valves with stems upright or horizontal, not inverted.
- K. Insulate piping.

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SECTION 23 21 16

PIPING SPECIALTIES

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes pressure gages and pressure gage taps, thermometers and thermometer wells, expansion tanks, air vents, air separators, strainers, balance valves, glycol specialties and flexible expansion loops.
 - B. Related Sections:
 - 1. Section 23 21 13– Hydronic Piping.

1.02 REFERENCES

- A. ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Codes, SEC VIII-D Rules for Construction of Pressure Vessels.
- B. ASME B40.1 (American Society of Mechanical Engineers) Gauges Pressure Indicating Dial Type Elastic Element.
- C. ASTM E1 Standard Specification for ASTM Thermometers.
- D. ASTM E77 Standard Test Method for Inspection and Verification of Thermometers.

1.03 SUBMITTALS

- A. Division 1 Shop drawings, product data and samples.
- B. Product Data: Submit for manufactured products and assemblies required for this Project.
 - 1. Manufacturer's data indicating use, operating range, total range, accuracy, and location for manufactured components.
 - 2. Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
 - 3. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each specialty.
 - 4. Submit electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures, application, selection, and hookup configuration. Include pipe and accessory elevations.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

A. Division 01 – Contract closeout procedures.
- B. Project Record Documents: Record actual locations of actual locations of components and instrumentation.
- C. Operation and Maintenance Data: Submit instructions for calibrating instruments, installation instructions, assembly views, servicing requirements, lubrication instruction, and replacement parts list.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- 1.06 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. Protect systems from entry of foreign materials by temporary covers, caps and closures, completing sections of the work, and isolating parts of completed system until installation.
 - D. Do not install instruments when areas are under construction, except for required rough in, taps, supports and test plugs.

1.07 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.08 WARRANTY

- A. Division 01 Warranties and Bonds.
- B. Provide one-year manufacturer warranty for piping specialties.

PART 2 PRODUCTS

2.01 PRESSURE GAGES

- A. Manufacturers:
 - 1. Trerice.
 - 2. Marshaltown.
 - 3. Ashcroft.
 - 4. Approved Equal.
- B. Gage: ASME B40.1, with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.

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- 1. Case: Cast aluminum.
- 2. Bourdon Tube: Phosphor bronze.
- 3. Dial Size: 3-1/2" diameter.
- 4. Mid-Scale Accuracy: One percent.
- 5. Scale: psi.

2.02 PRESSURE GAGE TAPS

- A. Needle Valve: Brass, ¼ inch NPT for minimum 300 psi.
- B. Ball Valve: Brass for 250 psi.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch NPT connections.

2.03 STEM TYPE THERMOMETERS

- A. Manufacturers:
 - 1. Trerice.
 - 2. Marshaltown.
 - 3. Ashcroft.
 - 4. Approved Equal.
- B. Thermometer: ASTM E1, adjustable angle, red appearing mercury, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.
 - 1. Size: 9-inch scale.
 - 2. Window: Clear Lexan.
 - 3. Stem: Extended brass, ³/₄ inch NPT.
 - 4. Accuracy: ASTM E77, 2 percent.
 - 5. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.
- 2.05 DIAPHRAGM-TYPE EXPANSION TANKS
 - A. Manufacturers:
 - 1. Amtrol.
 - 2. Taco.

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- 3. Armstrong.
- 4. Approved Equal.
- B. Construction: Welded steel, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel support legs or saddles. If required by the drawing's schedules: tested and stamped in accordance with ASME SEC 8-D; supplied with National Board Form U-1
- C. Accessories: Pressure gage and air-charging fitting, tank drain; pre-charge to 12 psig.

2.06 AIR VENTS

- A. Manufacturers:
 - 1. Hoffman.
 - 2. Armstrong.
 - 3. Bell & Gossett.
 - 4. Approved Equal.
- B. Manual Type: Disk type vent with built-in check valve for manual or automatic operation, discs replaceable without draining system, 1/8 inch shank, rated at 50 psi, Hoffman No. 500 or equal; provide with air chamber, brass construction, 6 cubic inch volume, Hoffman No. 550 or equal.
- C. Float Type: Brass or semi-steel body, copper float, stainless steel valve and valve seat; 1/8 inch NPT connection to atmosphere with drain piping suitable for system operating temperature and pressure; with isolating valve. Hoffman No. 79 or equal.
- D. High Capacity Automatic Air Vent: Cast iron body, stainless steel and brass trim, EPDM diaphragm, rated for 300°F, 350 PSIG, ³/₄ inch system connection, 1/2 inch NPT connection to atmosphere with drain piping. Provide with isolation valve and strainer upstream of vent. Hoffman 792 or equal.

2.07 AIR SEPARATORS

- A. Manufacturers:
 - 1. Spirotherm.
 - 2. Taco.
 - 3. Bell & Gossett.
 - 4. Approved Equal.
- B. Combination Air Separators/Strainers:
 - 1. Steel, tested and stamped in accordance with ASME SEC 8-D; for 125 psig operating pressure, with integral bronze strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.

- A. Manufacturers:
 - 1. Grinnell.
 - 2. Armstrong.
 - 3. Bell & Gossett.
 - 4. Approved Equal.
- B. Size 2 inch and Under:
 - 1. Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32" stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch:
 - 1. Flanged iron body for 175 psig working pressure, Y pattern with 3/64" stainless steel perforated screen.

2.09 BALANCE VALVES

- A. Manufacturers:
 - 1. Bell & Gossett.
 - 2. Taco.
 - 3. Approved Equal.
- B. Calibrated, ball or plug type balance valve with precision machined orifice, readout valves equipped with integral check valves and gasketed caps, calibrated nameplate and indicating pointer. Threaded connections.

2.10 RELIEF VALVES

- A. Manufacturers:
 - 1. Watts.
 - 2. Taco.
 - 3. Bell & Gossett.
 - 4. Approved Equal.
- B. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated capacities ASME certified and labeled.

2.11 GLYCOL CHARGING

- A. Manufacturers:
 - 1. Axiom.

- 2. Wessels.
- 3. Bell & Gossett.
- 4. Approved Equal.
- B. Prefabricated automatic glycol make-up tank. Complete with pump, magnetic starter, pressure tank, pressure control, strainer, priming valve, adjustable pressure reducing valve set at 12 psig, shut off valve, pressures gauge.
- C. Factory automatic controls: Maintains fill pressure of glycol system, low level or excess pressure shall cut-off pump, audible low-level or excessive pressure alarm with silence switch, low-level or excessive pressure visible alarm, signal for remote alarm
- D. Construction: 55 gallon translucent polyethylene tank with lid. Lid shall be capable of accommodating system relief piping. Pumping assembly shall be mounted on steel frame with legs. Tank shall be mounted on steel frame above pumping assembly.

2.12 GLYCOL SOLUTION

- A. Manufacturers:
 - 1. Dowfrost HD.
 - 2. Approved Equal.
- B. Solution: Inhibited propylene glycol and water solution, pre-mixed 50 percent glycol 50 percent water, suitable for operating temperatures down to -30°F.

2.13 FLEXIBLE EXPANSION LOOPS

- A. Manufacturers:
 - 1. Metraflex.
 - 2. Approved Equal.
- B. Performance: Flexible type expansion loop designed to impart no thrust loads on pipe anchors. Flexible expansion loops shall be capable of plus or minus 4 inches expansion/contraction.
- C. Construction: Manufactured assembly consisting of two flexible piping sections of hose and braid, two 90° elbows, and 180° return. Provide with drain plug, air vent connection, and/or 180° return section support assembly. Construction material shall be same as connected piping system.

PART 3 EXECUTION

- 3.01 INSTALLATION
 - A. Install positive displacement meters in accordance with AWWA M6, with isolating valves on inlet and outlet. Provide full line size bypass with ball valve for liquid service meters.
 - B. Install one pressure gage per pump, with taps on suction and discharge of pump; pipe to gage.

- C. Install gage taps in piping.
- D. Install pressure gages with pulsation dampers. Provide needle valve or ball valve to isolate each gage. Extend nipples to allow clearance from insulation.
- E. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- F. Install thermometer sockets adjacent to controls systems thermostat, transmitter, or sensor sockets. Where thermometers are provided on local panels, or pipe mounted thermometers are not required.
- G. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- H. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- I. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- J. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- K. Provide manual air vents at system high points and as indicated.
- L. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- M. Provide air separator on suction side of system circulation pump and connect to expansion tank.
- N. Provide drain and hose connection with valve on strainer blow down connection.
- O. Provide balancing valves on water outlet from terminal heating units such as radiation, unit heaters, and radiant heat manifolds.
- P. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- Q. Pipe relief valve outlet to nearest floor drain.
- R. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.
- S. Feed glycol solution to system through make-up line with pressure regulator, venting system high points. Set to fill at 12 psig. Pressure system cold at 5 psig.
- T. Flexible expansion loops may be used in place of expansion loops indicated on the drawings.
- U. Install flexible expansion loops in accordance with manufacturer's instructions. Where loops are installed hanging down, provide low point drain. Where loops are installed horizontal, provide end of loop support. Do not install with loops straight up to prevent air traps. Provide pipe guide within four pipe diameters of loop.

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3.02 FIELD QUALITY CONTROL

- A. Division 01 Quality Requirements.
- B. Test for strength of glycol and water solution and submit written test results.

3.03 CLEANING

- A. Division 01 Contract closeout procedures.
- B. Clean and flush glycol system before adding glycol solution. Refer to Section 23 21 13 Hydronic Piping.
- 3.04 PROTECTION OF INSTALLED CONSTRUCTION
 - A. Do not install hydronic gauges until after systems are cleaned.

3.05 AIR VENT APPLICATION SCHEDULE

Location	Type
Terminal heating units, mains below	Manual
Terminal heating units, mains above	None
Heating mains, at high points in system	Automatic
Combination air separator/strainers	High capacity
As Indicated on Drawings	Per Drawings

Note: For terminal heating units, mains above unit, install branch piping connections at bottom of mains or 45° from bottom to allow air migration to mains.

SECTION 23 21 23

PUMPS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes system lubricated circulators, inline circulators and vertical inline pumps.
- B. Related Sections:
 - 1. Section 23 21 13 Hydronic Piping: Execution requirements for connection to pumps specified by this section.
 - 2. Division 26.

1.02 REFERENCES

A. UL 778 (Underwriters Laboratories, Inc.) - Motor Operated Water Pumps.

1.03 PERFORMANCE REQUIREMENTS

A. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

1.04 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements. Submit also, manufacturer model number, dimensions, service sizes and finishes.
- C. Manufacturer's Installation Instructions: Submit application, selection, and hookup configuration with pipe and accessory elevations. Submit hanging and support requirements and recommendations.

1.05 CLOSEOUT SUBMITTALS

- A. Division 01 Contract Close-Out Procedures.
- B. Operation and Maintenance Data: Submit installation instructions, servicing requirements, assembly views, lubrication instructions, and replacement parts list.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years' experience.
- 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- 1.08 FIELD MEASUREMENTS
 - A. Verify field measurements prior to fabrication.

1.09 WARRANTY

- A. Division 01 Warranties and Bonds.
- B. Provide one-year manufacturer warranty for pumps.

PART 2 PRODUCTS

2.01 SYSTEM LUBRICATED CIRCULATORS

- A. Manufacturers:
 - 1. Taco.
 - 2. Armstrong.
 - 3. Bell & Gossett.
 - 4. Grundfos.
 - 5. Approved Equal.
- В.
- C. Type: Horizontal shaft, single stage, direct connected with multiple speed (where scheduled), wet rotor motor for in-line mounting, for 140 psig maximum working pressure, 230°F maximum water temperature.
- D. Casing: Cast iron or Bronze (where scheduled) with flanged pump connections.
- E. Impeller, Shaft, Rotor: Stainless Steel.
- F. Bearings: Metal Impregnated carbon (graphite) and ceramic.
- G. Motor: Impedance protected.

2.02 CIRCULATORS

- A. Manufacturers:
 - 1. Taco.
 - 2. Grundfos
 - 3. Bell & Gossett.
 - 4. Approved substitution.

- B. Type: Horizontal shaft, single stage, direct connected for in-line mounting, for 150 psig maximum working pressure, 225°F maximum water temperature, UL listed.
- C. Casing: Cast iron or stainless steel (where scheduled) with flanged pump connections, suction/discharge pressure taps.
- D. Impeller, Shaft, Rotor: Stainless steel.
- E. Bearings: Permanently lubricated ball bearing.
- F. Seals: Carbon/silicon-carbide mechanical seal.

2.03 IN-LINE CIRCULATORS

- A. Manufacturers:
 - 1. Bell & Gossett.
 - 2. Armstrong.
 - 3. Taco.
 - 4. Grundfos.
 - 5. Approved Equal.
- B. Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in-line mounting, oil lubricated, for 125 psig maximum working pressure.
- C. Casing: Cast iron, with flanged pump connections.
- D. Impeller: Cadmium plated steel, Stamped brass or cast bronze keyed to shaft.
- E. Bearings: Two, oil lubricated bronze sleeves.
- F. Shaft: Alloy or stainless steel with copper or bronze sleeve, integral thrust collar.
- G. Seal: Carbon rotating against stationary ceramic seat, 225°F maximum continuous operating temperature.
- H. Drive: Flexible coupling.
- 2.04 VERTICAL IN-LINE PUMPS A. Manufacturers:
 - 1. Bell & Gossett.
 - 2. Armstrong.
 - 3. Taco.
 - 4. Grundfos.
 - B. Approved Equal.

- C. Type: Vertical, single stage, close coupled, radial split casing, for horizontal or vertical in-line mounting, for 175 psig working pressure.
- D. Casing: Cast iron, with suction and discharge gage port, casing wear ring, seal flush connection, drain plug, flanged suction and discharge.
- E. Impeller: Bronze, fully enclosed, keyed directly to motor shaft or extension.
- F. Shaft: Alloy steel with 304 stainless steel impeller cap screw.
- G. Shaft Sleeve: Aluminum bronze.
- H. Seal: Carbon rotating against a stationary ceramic seat, 225°F maximum continuous operating temperature.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install long radius reducing elbows or reducers between pump and piping. Support piping adjacent to pump such that no weight is carried on pump casings. For base mounted pumps, provide supports under elbows on pump suction and discharge line sizes 4 inches and over.
- B. Provide line sized shut-off valve and strainer on pump suction, and line sized soft seat check valve and balancing valve on pump discharge.
- C. Lubricate pumps before start-up.

3.02 FIELD QUALITY CONTROL

- A. Division 01 Quality Control: Testing and Inspection Services.
- B. Section 23 05 93 Testing, Adjusting, and Balancing.

SECTION 23 31 00

DUCTS

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes low pressure metal ductwork.
 - B. Related Sections:
 - 1. Division 09 Painting.
 - 2. Section 23 05 29 Hangers and Supports: Product requirements for hangers, supports and sleeves for placement by this section.

1.02 REFERENCES

- A. ASTM A36 Structural Steel.
- B. ASTM A90 Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- C. ASTM A525 General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- D. ASTM A527 Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.
- E. NFPA 90A (National Fire Protection Association) Installation of Air Conditioning and Ventilating Systems.
- F. SMACNA (Sheet Metal Air Conditioning Contractors' National Association) HVAC Air Duct Leakage Test Manual.
- G. SMACNA (Sheet Metal Air Conditioning Contractors' National Association) HVAC Duct Construction Standards Metal and Flexible.
- H. UL 181 (Underwriters Laboratories, Inc.) Factory-Made Air Ducts and Connectors.

1.03 PERFORMANCE REQUIREMENTS

A. No variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.04 SUBMITTALS

- A. Division 01 Administrative Requirements.
- B. Shop Drawings: Indicate duct fittings, gages, sizes, welds, and configuration for medium pressure vehicle exhaust systems.
- C. Product Data: Submit data for duct materials, duct connectors, flexible duct.

1.05 CLOSEOUT SUBMITTALS

- A. Division 01 Contract closeout procedures.
- B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.
- 1.06 QUALITY ASSURANCE
 - A. Perform Work in accordance with SMACNA HVAC Duct Construction Standards Metal and flexible.
 - B. Construct ductwork to NFPA 90A standards.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealant.

1.09 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.01 DUCT MATERIALS

- A. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of in conformance with ASTM A90.
- B. Fasteners: Rivets, bolts, or sheet metal screws.
- C. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.02 LOW PRESSURE DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide airfoil turning vanes.

Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.

- C. Increase duct sizes gradually, not exceeding 15° divergence wherever possible; maximum 30° divergence upstream of equipment and 45° convergence downstream.
- D. Provide standard 45° lateral wye takeoffs unless otherwise indicated where 90° conical tee connections may be used.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Verify sizes of equipment connections before fabricating transitions.

3.02 INSTALLATION

- A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.
- B. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Use double nuts and lock washers on threaded rod supports.

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SECTION 2	23 33 00
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DUCTS ACCESSORIES

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes flexible duct connections.

1.02 REFERENCES

- A. NFPA 90A (National Fire Protection Association) Installation of Air Conditioning and Ventilating Systems.
- B. SMACNA (Sheet Metal Air Conditioning Contractors' National Association) HVAC Duct Construction Standards Metal and Flexible.
- C. UL 33 (Underwriters Laboratories, Inc.) Heat Responsive Links for Fire-Protection Service.
- D. UL 555 (Underwriters Laboratories, Inc.) Fire Dampers and Ceiling Dampers.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Product Data: Submit data for shop fabricated assemblies including volume control dampers and duct access doors.
- 1.04 CLOSEOUT SUBMITTALS
 - A. Division 01 Contract closeout procedures.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

1.07 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.08 EXTRA MATERIALS

- A. Division 01 Spare parts and maintenance materials.
- B. Supply two each size and type of fusible link.

PAGE 2 OF 2

PART 2 PRODUCTS

- 2.01 FLEXIBLE DUCT CONNECTIONS
 - A. Manufacturers:
 - 1. Ductmate.
 - 2. Duro-Dyne.
 - 3. Approved Equal.
 - B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated.
 - C. Connector: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq. yd.
 - 2. Net Fabric Width: Approximately 3 inches wide.
 - 3. Metal: 3" wide, 24 gage galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Division 01 Administrative Requirements.
- B. Verify ducts and equipment installation are ready for accessories.

3.02 INSTALLATION

- A. Install in accordance with NFPA 90A and follow SMACNA HVAC Duct Construction Standards Metal and Flexible.
- B. Provide back-draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct access doors for inspection and cleaning of automatic dampers, and elsewhere as indicated. Provide duct access doors for inspection and adjustment of backdraft dampers. Provide minimum 8" x 8" size for hand access, 18" x 18" size for shoulder access, and as indicated. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire dampers at locations indicated on contract drawings. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

SECTION 23 34 00

FANS

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes centrifugal fans, drives and accessories.
 - B. Related Sections:
 - 1. Section 23 07 00 Mechanical Insulation: Product requirements for power ventilators for placement by this section.
 - 2. Section 23 31 00 Ducts: Product requirements for hangers for placement by this section.
 - 3. Section 23 33 00 Duct Accessories: Product requirements for back-draft dampers for placement by this section.
 - 4. Division 26 Equipment: Execution and product requirements for connecting equipment specified by this section.

1.02 REFERENCES

- A. ABMA STD 9 (American Boiler Manufacturers Association) Load Ratings and Fatigue Life for Ball Bearings.
- B. AMCA 99 (Air Movement and Control Association) Standards Handbook.
- C. AMCA 210 (Air Movement and Control Association) Laboratory Methods of Testing Fans for Rating.
- D. AMCA 300 (Air Movement and Control Association) Reverberant Room Method for Sound Testing of Fans.
- E. AMCA 301 (Air Movement and Control Association) Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

1.03 SUBMITTALS

- A. Division 01 Shop drawings, product data and samples.
- B. Shop Drawings: Indicate size and configuration of fan assembly, mountings, weights, ductwork and accessory connections.
- C. Product Data: Submit data on all fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- D. Manufacturer's Installation Instructions: Submit fan manufacturer's instructions.
- 1.04 CLOSEOUT SUBMITTALS
 - A. Division 10 Contract closeout procedures.

B. Operation and Maintenance Data: Submit instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- 1.06 DELIVERY, STORAGE AND HANDLING
 - A. Protect motors, shafts, and bearings from weather and construction dust.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not operate fans for any purpose until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

1.08 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.09 WARRANTY

- A. Division 01 Warranties and bonds.
- B. Provide one-year manufacturer warranty for fans.

PART 2 PRODUCTS

- 2.01 CEILING EXHAUST FANS
 - A. Manufacturers:
 - 1. Panasonic.
 - 2. Cook.
 - 3. Greenheck.
 - 4. Approved Equal.
 - B. Construction
 - 1. Centrifugal Fan Unit: Direct driven with galvanized steel housing, resilient mounted EC motor, wall cap with gravity back-draft damper.
 - 2. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and wall mounted switch.

- C. Grille
 - 1. Molded white plastic.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install fans with resilient mountings and flexible electrical leads.
- C. Install flexible connections between fan inlet and discharge ductwork. Ensure metal bands of connectors are parallel with minimum one" flex between ductwork and fan while running.
- D. Install fans with restraining snubbers. Adjust snubbers to prevent tension in flexible connectors when fan is operating.
- E. Provide sheaves required for final air balance.
- F. Provide safety screen where inlet or outlet is exposed.
- G. Provide backdraft dampers on discharge of exhaust fans or as indicated.
- H. Do not operate fans in normal operation until ductwork is clean, filters are in place, bearings are lubricated, and fan has been tested under observation.

PAGE 1 OF 2

SECTION 23 37 00	AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes louvers.

1.02 REFERENCES

- A. ADC 1062 (Air Diffusion Council) Certification, Rating and Test Manual.
- B. AMCA 500 (Air Movement and Control Association) Test Method for Louvers, Dampers and Shutters.
- C. ASHRAE 70 (American Society of Heating, Refrigerating and Air Conditioning Engineers) - Method of Testing for Rating the Airflow Performance of Outlets and Inlets.
- D. SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) HVAC Duct Construction Standard Metal and Flexible.

1.03 SUBMITTALS

- A. Division 1 Shop drawings, product data and samples.
- B. Product Data: Submit data outlets and inlets sizes, finish, performance, and type of mounting.

1.04 CLOSEOUT SUBMITTALS

- A. Division 1 Contract closeout procedures.
- B. Project Record Documents: Record actual locations of air outlets and inlets.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.06 WARRANTY

- A. Division 1 Closeout Submittals.
- B. Provide one-year manufacturer warranty for air outlets and inlets.

PART 2 PRODUCTS

2.01 LOUVERS

- A. Manufacturers:
 - 1. Ruskin.
 - 2. Greenheck.

- 3. Louvers and Dampers Inc.
- 4. Approved Equal.
- B. Frame: 5" deep, extruded aluminum, 0.081" wall thickness.
- C. Blade: Horizontal extruded aluminum 0.081" nominal wall thickness. Double drainable blade, sight proof, spaced 2 inches center to center. Designed to prevent penetration of wind-driven rain.
- D. Finish: Pearledize finish, color as selected by Architect.
- E. Performance:
 - 1. Tested per AMCA 500-L Wind Driven Rain Penetration Test.
- F. Basis of Design: Ruskin EME520DD.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Verify inlet/outlet locations.
 - B. Verify wall systems are ready for installation.
- 3.02 INTERFACE WITH OTHER PRODUCTS
 - A. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry and lighting arrangement.

SECTION 23 52 35

HEATING BOILERS AND ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Copper tube boilers.
 - 2. Controls and boiler trim.
 - 3. Hot water connections.
 - 4. Fuel burning system and connections
 - 5. Chimney connections.
- B. Related Sections:
 - 1. Division 3 –Cast-In-Place: Execution requirements for concrete housekeeping pads specified by this section.
 - 2. Section 23 11 23 Fuel Piping: Execution requirements for gas piping connections to boilers specified by this section.
 - 3. Section 23 21 13 Hydronic Piping: Execution requirements for hot water and steam piping for piping connections to boilers specified by this section.
 - 4. Division 26 Wiring Connections: Execution requirements for electric connections to boilers specified by this section.

1.02 REFERENCES

- A. Underwriters Laboratories:
 - 1. UL 795 Commercial-Industrial Gas Heating Equipment.
- B. American Society of Mechanical Engineers:
 - 1. ASME Section IV Boiler and Pressure Vessel Code Heating Boilers
 - 2. ASME CSD-1 Controls and Safety Devices for Automatically Fired Boilers
- C. Hydronics Institute:
 - 1. HI Testing and Rating Standard for Heating Boilers.
- D. National Fire Protection Association:
 - 1. NFPA 54 National Fuel Gas Code.
- E. 2012 International Fuel Gas Code (IFGC).

- 1.03 SUBMITTALS
 - A. Division 1 Administrative Requirements.
 - B. Submittal Requirements: In addition to submittal procedures as outlined under Division 1, mechanical submittals shall be submitted as follows:
 - 1. Product Data: Submit general layout and dimensions. Include size and location of water, fuel, electric and vent connections, electrical characteristics, weight and mounting loads.
 - 2. Efficiency Curves: At a minimum, submit efficiency curves for 100%, 50%, and 5% input firing rates at incoming water temperatures ranging from 60°F to 160°F.
 - 3. Pressure Drop Curve: Submit pressure drop curve for flows ranging from 0 GPM to maximum value of boiler.
 - a) If submitted material is different from that of the design basis, boiler manufacture shall incur all costs associated with reselection of necessary pumps. Possible differences include, but are not limited to, the pump type, pump pad size, electrical characteristics and piping changes.
 - 4. Test Reports: Indicate specified performance and efficiency is met or exceeded. Provide combustion test that includes boiler firing rate, over fire draft, gas flow rate, heat input, burner manifold gas pressure, percent carbon monoxide (CO), percent oxygen (O), percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency and heat output.
 - 5. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements and include start-up instructions.
 - 6. Manufacturers Field Reports: Indicate condition of equipment after start-up including control settings and performance chart of control system.

1.04 CLOSEOUT SUBMITTALS

- A. Division 1 Contract Close-Out Procedures.
- B. Contract Closeout Requirements: In addition to contract closeout requirements as outlined under Division 1, mechanical contract closeout requirements shall include the following:
 - 1. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list and maintenance and repair data.
- C. Provide one additional set of final filters (one 99% efficient filter per boiler specified).

1.05 QUALITY ASSURANCE

- A. Boiler
 - 1. Construction shall conform to ASME Section IV and UL 795. The boiler shall bear the ASME "H" stamp and be National Board Listed for 160 psi working pressure and 250°F.
 - 2. Gas Train and Safety Controls: Conform to requirements of UL 795 and CSD-1 IR.

- B. Provide services of manufacturer's authorized and factory-trained representative to perform the following functions:
 - 1. Inspect and verify installation.
 - 2. Checkout and startup/supervision. Submit startup report.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Installer: Company specializing in performing work of this section.
- 1.07 DELIVERY, STORAGE AND HANDLING
 - A. In accordance with Contract Documents.
 - B. Accept equipment and accessories on site in factory shipping packaging. Inspect for damage.
 - C. Protect equipment from damage by leaving packing in place until installation.
 - D. Equipment must be protected from inclement weather, flooding, electrical surges, etc.

1.08 FIELD MEASUREMENTS

A. Verify field measurements prior to installation.

1.09 START-UP OF EQUIPMENT

- A. Operating and Maintenance Instructions are to be furnished with each unit.
- B. The boiler shall be factory assembled and fire tested requiring only connections to the water circulating system (supply & return), fuel, electrical power, exhaust vent and air inlet (as specified/shown in contract drawings).
- C. Factory-authorized representatives shall perform start-up service on each unit.

1.10 WARRANTY

- A. Division 1 Warranties and Bonds.
- B. Boiler shall have the following warranties;
 - 1. The heat exchanger shall carry a 3-year limited warranty, and a 10-year warranty against thermal shock.
 - 2. The burner shall carry a 10-year limited warranty.
 - 3. All other parts shall have a 1-year limited warranty.

PART 2 PRODUCTS

2.01 BOILERS

- A. Manufacturers:
 - 1. Lochinvar.
 - 2. Thermal Solutions.
 - 3. Aerco.
 - 4. Approved substitutions.
- B. Hot Water Boilers: Modulating gas, copper tube boilers complete with controls and boiler trim.

2.02 GENERAL REQUIREMENTS

- A. Boiler
 - 1. Factory-packaged unit, complete with jacket, gas manifold, burner and controls mounted and wired, as specified in this Section.
 - 2. The complete boiler shall be factory fire tested by the manufacturer and a copy of the fire test report shall be supplied with the unit.
 - 3. Heat exchangers shall be constructed in accordance with Section IV of the ASME code, with straight, integral copper-finned tube construction and a gastketless header at top and bottom.
 - 4. The heat exchanger design must allow for individual access and replacement of each tube.
 - 5. The heat exchanger shall encompass the entire burner and be enclosed in stainless steel with a fully water-backed tube sheet.
 - 6. Each boiler shall be contained in a minimum 16-gauge negative pressure steel jacket protected with a powder-coated finish. The unit shall be able to operate with any jacket panels removed during inspection or maintenance periods.
- B. Fuel Burning System
 - 1. Radiant non-corroding ceramic burner, with no moving parts. Double-meshed screen, fiber-metal mats, aluminized or stainless steel construction of the burner will not be accepted.
 - 2. Burner operation shall be Full Modulation with minimum 3:1 turn down utilizing a VFD and air-fuel ratio valve for dependable, repeatable modulation. Dampers, linkages or a one-speed fan are not acceptable.
 - 3. Interrupted-type mixed fuel/air pilot system with electric spark-to-pilot ignition that utilizes a UV scanner to prove pilot before main gas valves open. Hot surface ignition systems are not acceptable.

- 4. The entire firing control sequence shall be monitored by a UL approved, commercialtype microprocessor flame safeguard programmer with first out fault annunciation and diagnostic indicator lights. Furnish pre-purge and post-purge timing. Shut down burner in the event of ignition pilot and/or main flame failure with manual reset.
- 5. Full frontal access port shall be provided for the control area.
- 6. The boiler will be equipped with a non-sparking blower manufactured with a cast aluminum housing.
- 7. Combustion air pressure switch shall be provided.
- 8. The blower shall be equipped with a replaceable combustion air filter, 99% efficient to one micron. The unit will have the capability of sealed, direct, or conventional venting. Air inlet dampers and vacuum relief dampers are not required for proper operation.
- C. Gas Train
 - 1. Gas train shall be UL/FM/CSD-1 compliant.
 - 2. The gas train shall be certified to take a maximum of 5 psi Natural Gas. Additional step-down regulators are not allowed and can cause nuisance shutdowns of the unit.
 - 3. Pilot and main gas pressure regulator.
 - 4. Automatic main and redundant gas valves.
 - 5. Motorized automatic main and redundant gas valves and a normally open vent valve in between (if IRI).
 - 6. Motorized automatic main and redundant gas valves w/ Proof of Closure contacts and a normally open vent valve in between (if IRI w/POC).
 - 7. Leak test valves downstream of each gas valve.
 - 8. High and low gas pressure switches.
 - 9. Manual shut off valve upstream of burner and downstream of last gas valve.
- D. Electrical Input
 - 1. Electrical input to each boiler shall be 120v/1ph. The manufacturer will mount the control transformer and fuses inside the unit, as needed, before it leaves the factory. Single-point electrical hook-up on every unit is required; separate power wiring and control wiring is not acceptable.
 - 2. The boilers must utilize a commercial quality 120v/1ph control system. A residential type 24v control system is not acceptable.
- E. Water Trim and Controls
 - 1. ASME rated pressure relief valve set at 30 psig.
 - 2. Combination water pressure and temperature gage. Furnish graduated pressure gauge scale from 1-1/2 to 3 times of pressure relief valve setting.
 - 3. A water flow switch to prevent burner operation during low water flow conditions.

- 4. An adjustable high limit temperature controller with manual reset to prevent water temperature from exceeding a safe system temperature.
- 5. An adjustable operating temperature controller.
- F. Venting
 - 1. It shall be AL 29-4C, positive pressure type vent material. Single wall vent is acceptable where allowed by local code and by boiler manufacturer.
 - 2. Barometric dampers are not allowed unless multiple boilers are combined into the same common vent.
- G. Air Intake Piping
 - 1. It can be PVC or galvanized smoke pipe that is sealed and pressure tight. Pipe must be at least the same size as the connection on the unit.
 - 2. Intake dampers and vacuum relief dampers are not required for sealed combustion/direct venting. Vacuum relief dampers can violate the intent of sealed combustion/direct vent applications.

2.03 PERFORMANCE

- A. The boiler shall have a minimum of 88% thermal efficiency as listed in the Equipment Schedule of the Contract Documents.
- B. The standards listed in Section 1.2 of this document shall be used to determine the required efficiency.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the boiler in accordance with manufacturer's printed instructions.
- B. Install plumb and level, to plus or minus 1/16 inch over base.
- C. Maintain manufacturer's recommended clearances around and over equipment, and as required by local Code.
- D. Arrange all electrical conduit, piping, exhaust vent, and air intake with clearances for burner removal and service of all equipment.
- E. Connect exhaust vent to boiler vent connection, full size of outlet.
- F. If shown in Contract Drawings, connect full sized air inlet vent to flanged connector on boiler.
- G. Connect fuel piping in accordance with NFPA 54.
- H. Connect fuel piping to unit, full size, at gas train inlet.
- I. Use full size (minimum) pipe/tubing on all gas vent connections.

- J. Connect water piping, full size, to supply and return connections.
- K. Install all piping accessories per the details on the contract drawings.
- L. Install discharge piping from relief valves and drain valves to nearest floor drain.
- M. Connect appropriate electrical power to the boiler.
- N. A dedicated disconnect shall be provided for each individual piece of equipment.

3.02 FIELD QUALITY CONTROL

- A. Provide services of manufacturer's authorized representative as specified in this Section.
- B. Perform combustion test including boiler firing rate, gas flow rate, heat input, burner manifold gas pressure, percent carbon monoxide, percent oxygen, percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, and heat output. Perform test at minimum, mid-range, and high fire.

3.03 CLEANING

- A. Must isolate boiler when any cleaning or testing of system piping is being performed.
- B. Flush and clean boilers upon completion of installation, in accordance with manufacturer's startup instructions.
- 3.04 DEMONSTRATION AND TRAINING
 - A. Demonstrate operation and maintenance procedures.

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SECTION 23 05 53

HEAT EXCHANGERS

PART 1 General

1.01 SUMMARY

- A. Section includes brazed plate type, accessories and trim.
- B. Related Sections:
 - 1. Section 23 05 29 Hangers and Supports: Execution requirements for heat exchanger supports specified by this section.
 - 2. Section 23 21 16 Piping Specialties: Product requirements for heat exchanger trim for placement by this section.
 - 3. Section 23 21 13 Hydronic Piping: Product requirements for piping drains and relief valves to floor drains for placement by this section.

1.02 REFERENCES

A. ASME (ANSI/American Society of Mechanical Engineers) - Boilers and Pressure Vessels Code.

1.03 SUBMITTALS

- A. Division 1 Shop drawings, product data and samples.
- B. Submittal Requirements: In addition to submittal procedures as outlined under Division 1, mechanical submittals shall be submitted as follows:
 - 1. Product Data: Submit performance data.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Accept heat exchangers on site in factory protective packaging. Inspect for damage.
- B. Protect entry of foreign material into openings with temporary caps.

PART 2 Products

2.01 BRAZED PLATE TYPE HEAT EXCHANGERS

- A. Manufacturers:
 - 1. Kelvion FlatePlate.
 - 2. Taco.
 - 3. Mueller.
 - 4. Bell & Gossett
 - 5. Approved Equal.

- B. Construction: 316 L Stainless steel plates, copper brazed.
- C. UL listed.

PART 3 Execution

3.01 INSTALLATION

- A. Support heat exchangers on welded steel pipe and angle floor stand.
- B. Provide water to glycol heat exchanger with trim as follows:
 - 1. Water Inlets and Outlets: Isolation valves, strainer, thermometer wells and pressure gage taps.
 - 2. Heat Water Inlet: Isolation valve, strainer, thermometer well and pressure gage tap.
 - 3. Heated Water Outlet: Isolation valve, thermometer well for temperature regulator sensor, thermometer well and pressure gage tap, ASME rated pressure and temperature relief valve and drain with valve.

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SECTION 23 82 00

TERMINAL HEATING UNITS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes unit heaters.

B. Related Sections:

- 1. Section 23 21 13 Hydronic Piping: Execution requirements for piping fittings and drains lines specified by this section.
- 2. Division 26 Equipment: Execution requirements for electric connection to units specified by this section.

1.02 REFERENCES

- A. ARI 410 (Air-Conditioning and Refrigeration Institute) Forced-Circulation Air-Cooling and Air-Heating Coils.
- B. SMACNA (Sheet Metal Air Conditioning Contractors' National Association) HVAC Duct Construction Standards, Metal and Flexible.

1.03 SUBMITTALS

- A. Division 1 Shop drawings, product data and samples.
- B. Shop Drawings: Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations. Indicate schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers
- C. Product Data: Submit equipment data including performance, construction and electrical requirements.
- D. Manufacturer's Installation Instructions: Submit.

1.04 CLOSEOUT SUBMITTALS

- A. Division 1 Contract closeout procedures.
- B. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access to valves.
- C. Operation and Maintenance Data: Submit manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept units on site in factory packing. Inspect for damage. Store under roof.
- B. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors. Protect coils from entry of dirt and debris with pipe caps or plugs.
- 1.07 FIELD MEASUREMENTS
 - A. Verify field measurements prior to fabrication.

1.08 WARRANTY

- A. Division 1 Warranties and Bonds.
- B. Provide one-year manufacturer's warranty for terminal heating units.

PART 2 PRODUCTS

2.01 UNIT HEATERS

- A. Manufacturers:
 - 1. Modine.
 - 2. Trane.
 - 3. Sterling.
 - 4. Approved Equal.
- B. Coils: Seamless copper tubing, silver brazed to steel headers, and with evenly spaced aluminum fins mechanically bonded to tubing.
- C. Casing: 0.0478" thick steel with threaded pipe connections for hanger rods.
- D. Finish: Factory applied baked enamel of color as selected by Architect.
- E. Fan: Direct drive propeller type, statically and dynamically balanced, with fan guard; horizontal models with permanently lubricated sleeve bearings.
- F. Air Outlet: Adjustable two-way louvers on horizontal throw models.
- G. Motor: Permanently lubricated sleeve bearings on horizontal models, grease lubricated ball bearings on vertical models.
- H. Control: Local disconnect switch.
- I. Capacity: As scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify wall construction is ready for installation.

B. Verify concealed blocking and supports are in place and connections are correctly located.

3.02 INSTALLATION

- A. Install equipment exposed to finished areas after walls and ceilings are finished and painted. Avoid damage.
- B. Unit Heaters: Hang from building structure, with pipe hangers anchored to building, not from piping. Seismically restrain units. Mount as high as possible to maintain greatest headroom unless otherwise indicated.

3.03 CLEANING

- A. Division 1 Final cleaning.
- B. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of enclosures.
- C. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.
SECTION 26 01 00 Operation and Maintanence of Electrical Systems

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes basic electrical requirements, basic electrical methods, and minimum requirements for construction documentation, such as coordination with Owner's representative, Submittals, As-Built Drawing and Operation and Maintenance manual preparation.

1.02 REFERENCES

- A. NECA (National Electrical Contractors Association) Standard of Installation.
- B. ANSI C2 (National Electrical Safety Code)
- C. NFPA 70 (National Electrical Code 2014 Edition)
- D. Latest adopted edition of the International Building Code and International Fire Code
- E. NETA (International Electrical Testing Association Inc 2013)
- F. SMACNA (Sheet Metal and Air Conditioning Contractors National Association) Seismic restraint manual.

1.03 SUBMITTALS

- A. Division 1 Submittals: Shop Drawings, Product Data and Samples.
- B. Submittal Requirements: In addition to submittal procedures as outlined under Division 1, electrical submittals shall be submitted as follows:
 - 1. Electrical equipment information shall be submitted complete and all at one time. Partial submittals may not be considered and may be returned without review. In some cases, the Owner's Representative may review partial submittals where early ordering of some equipment is essential to the project. Review of such partial submittals is at the discretion of the Owner's Representative. Any project delay due to the Contractor's failure to make complete submittals shall be the responsibility of the Contractor. Submittals shall be compiled in a notebook. The data shall be arranged and indexed by specification sections.
 - 2. Catalog sheets shall be complete, and the item or model proposed for use by the Contractor shall be clearly marked and identified as to which item in the specifications or on the drawings is being submitted.
 - 3. Shop drawings shall be submitted as a complete set at one time.

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1.04 SHOP DRAWINGS

A. Seismic Restraint Shop Drawings: Contractor shall submit structurally engineered shop drawings for seismic restraint of all equipment supplied under Division 26 where required by the International Building Code – 2009 Edition, Chapter 26. When required by the local jurisdiction, installation shop drawings shall be prepared and stamped by a professional engineer registered in the State of Alaska. Structural design shall be based on seismic use category II and seismic design category D.

1.05 CLOSEOUT SUBMITTALS

- A. Division 1 Contract Close-out Procedures
- B. Contract Closeout Requirements: In addition to contract closeout requirements as outlined under Division 1, electrical contract closeout requirements shall include the following:
 - 1. Record Documents:
 - a) Record Drawings.
 - b) Operation & Maintenance Manuals.
 - 2. Testing Reports.
 - 3. Equipment Startup Reports.
 - 4. Systems Demonstrations.
 - 5. Operation & Maintenance Instruction.

1.06 RECORD DOCUMENTS

- A. Record Drawings: In addition to record drawing requirements as outlined under Division 1, electrical record drawings shall include the following:
 - 1. Any and all changes made in the field with respect to original design drawings and shop drawings.
- B. Shop Drawings: Field accurate shop drawings shall be provided to the Owner. Record shop drawings shall be produced utilizing AutoCad version 13 or more current fully compatible release. Shop drawings shall be provided to the owner in both hardcopy and electronic format on CD media.
- C. Operation & Maintenance Manuals: In addition to Operation & Maintenance Manual requirements as outlined under Division 1, electrical O&M manuals shall include the following:
 - 1. Product data for each piece of equipment including local supplier and local manufacturer's representative including address, phone number, and fax number

- 2. Manufacturers operation & maintenance instructions for each piece of equipment.
- 3. Identification numbers for all parts and nearest source for obtaining parts.
- 4. Summary of maintenance instructions to Owner.
- 5. Periodic maintenance form.
- 6. Testing reports.
- 7. Equipment startup reports.

1.07 SUBSTITUTIONS

- A. Division 1 Product Options and Substitutions
- B. Substitution Requirements: In addition to substitution requirements as outlined under Division 1, electrical material and equipment substitutions shall meet the following minimum requirements as well as the requirements outlined in each section of these specifications:
 - 1. Size: Proposed substitutions shall be of equivalent size and fit within available space with adequate service access as recommended by the equipment manufacturer.
 - 2. Performance: Proposed substitutions shall have equal or superior performance to specified equipment.
 - 3. Quality: Proposed substitutions shall be of equal or greater quality to specified equipment.
 - 4. Weight: Proposed substitutions shall be of equal weight to specified equipment or Contractor shall be responsible for modifications to structure as required for increased weight.
 - 5. Accessories and Options: Proposed substitutions shall be provided with appropriate accessories and options as required for a complete and operational system.
- C. System Modifications: The Contractor shall be responsible for modifications to mechanical systems, electrical systems, and building structure and finishes as required for implementing proposed substitute products.

1.08 SUBMITTALS

- A. Division 1 Shop Drawings, Product Data and Samples.
- 1.09 CLOSEOUT SUBMITTALS

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- A. Division 1 Contract Close-out Procedures
- B. Project Record Documents: Record actual locations of components.
- PART 2 PRODUCTS: Not Used
- PART 3 EXECUTION
- 3.01 COORDINATION
 - A. Division 1 Coordination: Coordination and project conditions.
- 3.02 FIELD QUALITY CONTROL
 - A. Division 1 Contract Close-out Procedures.

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SECTION 26 02 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section Includes:
 - 1. Wire.
 - 2. Mechanical connectors.
 - 3. Rod Electrodes
 - 4. Exothermic connections.
 - 5. Installation Requirements

1.02 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- B. International Electrical Testing Association:
 - 1. NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 70 National Electrical Code.

1.03 SUBMITTALS

- A. Division 1 Shop Drawings, Product Data and Samples.
- B. Product Data: Submit data on grounding electrodes and connections.

1.04 CLOSEOUT SUBMITTALS

- A. Division 1 Execution Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and grounding electrodes.
- C. Test Reports: Provide copy of Ground Resistance Test Report.

1.05 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years' experience.

PART 2 PRODUCTS

2.01 WIRE

- A. Material: Stranded copper.
- B. Grounding Electrode Conductor: Copper conductor, bare for exterior installation, insulated for interior installation.
- C. Bonding Conductor: Copper conductor, insulated.

2.02 ROD ELECTRODES

- A. Available Manufacturers:
 - 1. Erico, Inc.
 - 2. O-Z Gedney Co.
 - 3. Thomas & Betts, Electrical
- B. Product Description:
 - 1. Material: Copper-clad steel.
 - 2. Diameter: 5/8 inch.
 - 3. Length: 10 feet.

2.03 MECHANICAL CONNECTORS

- A. Available Manufacturers:
 - 1. Erico, Inc.
 - 2. O-Z Gedney Co.
 - 3. Thomas & Betts, Electrical
- B. Description: Bronze connectors, suitable and listed for specific grounding and bonding application, in configurations required for particular installation.
- C. Rod Electrodes: Exothermic welded connection or mechanical compression connection.
- D. Building Steel: Exothermic welded connection or mechanical compression connection.

- E. Metallic Pipe: Mechanical connection suitable for grounding and bonding applications, in configuration required for particular installation.
- 2.04 EXOTHERMIC CONNECTIONS
 - A. Available Manufacturers:
 - 1. Cadweld, Erico, Inc
 - 2. Copperweld, Inc
 - 3. Thermo-weld Inc.
 - B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 EXECUTION

- 3.01 PREPARATION
 - A. Remove paint, rust, oils, and other surface contaminants at connection points.
- 3.02 INSTALLATION
 - A. At point of electrical service install three rod electrodes in a linear pattern along the exterior building foundation. Maintain minimum of 20' separation between rod electrodes. Bond electrodes together and to service disconnect grounding bar with #2 AWG.
 - B. At point of electrical service install # 2/0 AWG grounding electrode conductor from service disconnect grounding bar and connect to main utility water service piping.
 - C. At point of electrical service install # 2/0 AWG grounding electrode conductor from service disconnect grounding bar and connect to effectively grounded building steel. For this application, effectively grounded building steel shall be defined as steel that has a traceable conductive path to fasteners or reinforcement steel located within the concrete footings.
 - D. At point of electrical service install #2/0 AWG grounding electrode conductor from service disconnect to 20' of same conductor encased in bottom of concrete footings. Bond to reinforcing steel at a minimum of two locations.
 - E. Install grounding and bonding conductors concealed from view except in unfinished locations, such as electrical, mechanical and fan rooms. Identify with green tape and printed label a minimum of every 20'.
 - F. Bond together each new metallic raceway, pipe, duct and other metal objects per NEC article 250-104.

- G. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
- H. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
- I. Permanently attach equipment and grounding conductors prior to energizing equipment.
- 3.03 FIELD QUALITY CONTROL
 - A. Division 1: Field inspecting, testing, adjusting, and balancing.
 - B. Perform ground resistance testing of complete grounding electrode system employing the three-point fall of potential method in accordance with IEEE 142.

SECTION 26 05 03	EQUIPMENT WIRING CONNECTIONS

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes electrical connections to equipment.
 - B. Related Sections:
 - 1. Section 26 05 19 Low-Voltage Electrical Conductors and Cables.
 - 2. Section 26 05 33 Raceway and Boxes for Electrical Systems.

1.02 REFERENCES

- A. NEMA WD 1 (National Electrical Protection Association) General Purpose Wiring Devices.
- B. NEMA WD 6 (National Electrical Protection Association) Wiring Devices Dimensional Requirements.

1.03 SUBMITTALS

- A. Division 1 Shop Drawings, Product Data and Samples.
- B. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's installation instructions.

1.04 CLOSEOUT SUMBITTALS

- A. Division 1 Contract Close-out Procedures: Submittal procedures.
- B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.05 COORDINATION

- A. Division 1 Coordination: Coordination and project conditions.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams and manufacturer's instructions for equipment furnished under other sections, including but not limited to kitchen equipment, fire station equipment, mechanical equipment, radio and communication equipment and other systems.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.

E. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.01 CORD AND PLUGS

- A. Attachment Plug Construction: Conform to NEMA WD 1.
- B. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
- C. Cord Construction: Type SO heavy duty multi-conductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations. Provide suitable cord caps with strain relief connectors.
- D. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection or rating of supply receptacle, whichever is greater.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Division 1 Administrative Requirements: Coordination and project conditions.
- B. Verify equipment is ready for electrical connection, wiring, and energization.

3.02 INSTALLATION

- A. Make electrical connections.
- B. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit with watertight connectors and drip loop in damp or wet locations and connections to pumps.
- C. Connect heat-producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes, equipment connection boxes, and at connections to equipment and machinery.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.03 ADJUSTING

- A. Division 1 Contract Close-out Procedures: Testing, adjusting, and balancing.
- B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

SECTION 26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes building wire and cable and wiring connectors and connections.

1.02 REFERENCES

- A. NECA (National Electrical Contractors Association) Standard of Installation.
- B. NETA ATS (International Electrical Testing Association) Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. NEMA WC5 (Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy)

1.03 WIRING METHODS AND PRODUCT REQUIREMENTS

- A. Product Requirements: Use products as indicated and as follows:
 - 1. Use stranded conductors for control circuits.
 - 2. Use conductor not smaller than 16 AWG for control circuits.
 - 3. Use conductor not smaller than 12 AWG for power and lighting circuits.
 - 4. Use 10 AWG conductors for 20 ampere, 120volt branch circuits longer than 75 feet.
- B. Wiring Methods: Use wiring methods indicated and as follows:
 - 1. Concealed Dry Interior Locations: Use building wire with type THHN/THWN or XHHW insulation, in raceway.
 - 2. Exposed Dry Interior Locations: Use building wire with type THHN/THWN or XHHW insulation, in raceway.
 - 3. Above Accessible Ceilings: Use building wire with type THHN/THWN or XHHW insulation, in raceway.
 - 4. Wet or Damp Interior Locations: Use building wire with type THHN/THWN or XHHW insulation, in raceway. Provide raceway and components listed for use in damp or wet locations.
 - 5. Exterior and underground locations: Use building wire with type XHHW insulation in raceway. Provide raceway and components listed for use in damp and wet locations
- 1.04 CLOSEOUT SUBMITTALS

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- A. Division 1 Contract Closeout Procedures
- B. Project Record Documents: Record actual locations of components.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.

1.06 COORDINATION

- A. Division 1 Coordination: Coordination and project conditions.
- B. Where wire and cable destination are indicated, and routing is not shown, determine exact routing and lengths required.
- C. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 PRODUCTS

2.01 BUILDING WIRE

- A. Manufacturers:
 - 1. Diamond Wire & Cable Co.
 - 2. Rome Cable
 - 3. General Cable Co.
 - 4. Substitutions: Division 1 Substitutions.
- B. Product Description: Single conductor insulated wire.
- C. Conductor: Copper.
- D. Insulation Voltage Rating: 600 volts.
- E. Insulation: NFPA 70; Type THHN/THWN and XHHW insulation for feeders and branch circuits as scheduled, rated 90 degrees C.

2.02 WIRING CONNECTORS

A. Units of size, ampacity rating, materials, type, and class suitable for specific application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Division 1 Coordination: Coordination and project conditions.
- B. Verify that mechanical work likely to damage wire and cable has been completed.
- C. Verify that raceway installation is complete and supported.

3.02 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.
- 3.03 INSTALLATION BUILDING WIRE
 - A. Route wire and cable as required to meet Project conditions.
 - B. Install wire and cable in accordance with the NECA "Standard of Installation."
 - C. Neatly train and lace wiring inside boxes, equipment, and panelboards.
 - D. Identify wire and cable under provisions of Section 26 05 53.
 - E. Special Techniques-Building Wire in Raceway:
 - 1. Pull all conductors into raceway at same time.
 - 2. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
 - F. Special Techniques-Wiring Connections:
 - 1. Clean conductor surfaces before installing lugs and connectors.
 - 2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
 - 3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
 - 4. Use reversible pressure connectors for copper conductor splices and taps, 6 AWG and larger.
 - 5. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
 - 6. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- 3.04 INSTALLATION HEAT TRACE CABLING:

- A. The heating cable shall be installed according to the manufacturer's recommendations, the instructions supplied with the heating cable and components, and the instructions in the Installation and Operation Manual.
- B. The heating cable shall be installed only in concrete pavement designed for long-term structural integrity. The pavement shall be reinforced with rebar or wire mesh and the reinforcing supported such that the location of the reinforcing and the attached heating cable is not disturbed during the concrete placement. The rebar shall be placed at the heating-cable depth whenever possible.
- C. The heating cable shall be protected from where it leaves the pavement to the junction box by installing the cable in 1-inch rigid metal conduit. Use one conduit for each heating cable.
- D. The power connection and end seal junction box shall be mounted above grade. The junction box shall be installed so that water cannot enter it.
- E. Heating-cable repairs and splices shall be made using a splice kit provided by the manufacturer and specifically approved for the purpose.
- F. The entire cable system shall pass the Megger test after installation.
- G. Testing:
 - 1. The heating cable shall be tested for insulation resistance with a 2500-Vdc Megger after installation, during the concrete pour, and after the concrete has completely cured according to the manufacturer's recommendations and following the instructions provided in the ElectroMelt Installation and Operation Manual (H53392).

3.05 WIRE COLOR

- A. General
 - 1. For wire sizes 10 AWG and smaller wire shall be colored as indicated below.
 - 2. For wire sizes 8 AWG and larger identify wire with colored tape at all terminals, splices and boxes.
 - 3. Colors to be as indicated below.
 - a) Use black, for circuits at 120/240 volts single phase.
- B. Neutral Conductors: White for circuits at 120/240 volts single phase. Where there are two or more neutrals in one conduit, each shall be individually identified with the proper circuit. For 4 AWG and larger, identify with white tape at both ends and all visible points included in all junction boxes
- C. Ground Conductors: Green for 6 AWG and smaller. For 4 AWG and larger, identify with green tape at both ends and all visible points and in all junction boxes.

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3.06 FIELD QUALITY CONTROL AND TESTING

- A. Division 1 Contract Closeout Procedures.
- B. General Reference: Inspect in accordance with NETA ATS.

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SECTION 26 05 29 HANGARS AND SUPPORTS FOR ELECTRICAL SYSTEMS.

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section Includes:
 - 1. Conduit supports.
 - 2. Formed steel channel.
 - 3. Firestopping relating to electrical work.
 - 4. Firestopping accessories.
 - 5. Equipment bases and supports.
 - B. Related Sections:
 - 1. Division 3 Cast in Place Concrete: Product requirements for concrete.

1.02 REFERENCES

- A. American Society for Testing and Materials:
 - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 3. ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- B. Factory Mutual System:
 - 1. FM Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.
- C. National Fire Protection Association:
 - 1. NFPA 70 National Electrical Code.
- D. Underwriters Laboratories Inc.:
 - 1. UL 263 Fire Tests of Building Construction and Materials.
 - 2. UL 723 Tests for Surface Burning Characteristics of Building Materials.
 - 3. UL 1479 Fire Tests of Through-Penetration Firestops.

4. UL - Fire Resistance Directory.

1.03 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.04 SYSTEM DESCRIPTION

A. Firestopping Materials: To achieve fire ratings as noted on Architectural Drawings for adjacent construction, but not less than 1-hour fire rating for penetrations of rated surfaces. The contractor responsible shall employ individuals skilled in such work to do the sealing and fireproofing.

1.05 SUBMITTALS

- A. Division 1 Shop Drawing, Product Data and Samples.
- B. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
 - 2. Firestopping: Submit data on product characteristics, performance and limitation criteria.
 - 3. Firestopping: Submit preparation and installation instructions.
 - 4. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.
- B. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.
- C. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.01 CONDUIT SUPPORTS

- A. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- B. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- C. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- D. Conduit clamps general purpose: One-hole malleable iron for surface mounted conduits.

2.02 FORMED STEEL CHANNEL

- A. Product Description:
 - 1. Exterior and exposed locations: Galvanized 12 gage thick steel, with holes 1-1/2 inches on center. Field coat cut ends with corrosion resistive paint.
 - 2. Interior concealed locations: Galvanized or manufacturer painted 12 gage thick steel, with holes 1-1/2 inches on center.
 - 3. Use manufacturers' standard connectors, brackets and accessories for interconnection of channel components and attachments to structures.

2.03 FIRESTOPPING

- A. Available Manufacturers:
 - 1. Dow Corning Corp.
 - 2. Nelson Firestop.
 - 3. 3M fire Protection Products.
 - 4. Substitutions: Section 01 63 00 Product Options and Substitutions or Approved Equal..
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
 - 1. Silicone Firestopping Elastomeric Firestopping: Single or multiple component silicone elastomeric compound and compatible silicone sealant.
 - 2. Foam Firestopping Compounds: Single or multiple component foam compound.

- 3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
- 4. Fiber Stuffing and Sealant Firestopping: Composite of fiber stuffing insulation with silicone elastomer for smoke stopping.
- 5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
- 6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
- 7. Firestop Pillows: Formed mineral fiber pillows.

2.04 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Dam Material: Permanent, as recommended by manufacturer.
- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- D. General:
 - 1. Furnish UL listed products.
 - 2. Select products with rating not less than rating of wall or floor being penetrated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Division 1 Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive firestopping.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.
- C. Install backing and/or damming materials to arrest liquid material leakage.
- D. Do not drill or cut structural members.

3.03 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Provide steel expansion head anchors.
 - 2. Steel Structural Elements: Provide beam clamps.
 - 3. Concrete Surfaces: Provide steel expansion head anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts.
 - 5. Solid Masonry Walls: Provide steel expansion head anchors.
 - 6. Sheet Metal: Provide sheet metal screws.
 - 7. Wood Elements: Provide wood screws.
- B. Install conduit and raceway support and spacing in accordance with NEC.
- C. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- D. Install multiple conduit runs on common hangers.
- E. Supports:
 - 1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
 - 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
 - 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
- F. Provide seismic restraint of supports in compliance with the guidelines published in SMACNA seismic restraint manual, or similar recognized publication.

3.04 INSTALLATION – FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
- B. Fire Rated Surface:
 - 1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
 - a) Pack void with backing material.
 - b) Seal ends of penetration with UL listed fire resistive silicone compound to meet fire rating of structure penetrate. in accordance with manufacturer's instructions.

c) All products and installed assembly must be UL listed or tested by an independent testing laboratory

C. Non-Rated Surfaces:

- 1. At interior wall or floor openings use Tremco Dymonic, Sika Corp. Sikaflex la, Sonneborn Sonolastic NPI, or Mameco Vilken 116 urethane caulk or approved equal to effect the seal
- 2. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.

3.05 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- B. Construct supports of steel members and/or formed steel channel. Brace and fasten with flanges bolted to structure. Follow manufactures installation instructions and SMACNA guidelines for seismic restraint installation requirements.
- 3.06 FIELD QUALITY CONTROL
 - A. Inspect installed firestopping for compliance with specifications and manufacturer's installation instructions.
- 3.07 CLEANING
 - A. Clean adjacent surfaces of firestopping materials.
- 3.08 PROTECTION OF FINISHED WORK
 - A. Protect adjacent surfaces from damage by material installation.

SECTION 26 05 33 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes conduit and tubing, wireways, outlet boxes, pull and junction boxes.

1.02 REFERENCES

- A. ANSI C80.1 Rigid Steel Conduit, PVC Coated
- B. ANSI C80.1 Rigid Steel Conduit, Zinc Coated.
- C. ANSI C80.3 Electrical Metallic Tubing, Zinc Coated.
- D. NECA (National Electrical Contractors Association) "Standard of Installation"
- E. NEMA FB 1 (National Electrical Manufacturers Association) Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- F. NEMA TC 2 (National Electrical Manufacturers Association) Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
- G. NEMA OS 1 (National Electrical Manufacturers Association) Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- H. NEMA 250 (National Electrical Manufacturers Association) Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 SYSTEM DESCRIPTION

- A. Raceway and boxes located as shown on Drawings, and at other locations where required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway as required to complete wiring system.
- B. Panelboard Feeders: Use rigid steel conduit or electrical metallic conduit. Use pull and junction boxes where necessary. Conduit to be routed concealed wherever physically possible, except at equipment termination locations and in unfinished areas.
- C. Wet and Damp Locations: Use rigid steel conduit. Use corrosion resistant metal weatherproof outlet, pull, and junction boxes. Use flush mounting outlet box in finished areas.
- D. Building interior below grade: Use rigid steel conduit, PVC conduit or PVC coated rigid steel conduit, with compatible fittings and accessories. For transitions out of or through concrete use rigid steel conduit. Minimum size conduit shall be 3/4".

- E. Building exterior below grade: Use PVC coated rigid steel conduit or rigid steel conduit with compatible fittings and accessories. Minimum size conduit shall be 1". Telephone and television utility service entrance conduits may be PVC conduit.
- F. Concealed Dry Locations: Use rigid steel, intermediate metal conduit, or electrical metallic tubing. Metal clad cable may be used as a wiring means within interior partition walls. Use sheet-metal boxes. Use flush mounting outlet box in finished areas.
- G. Concealed dry locations encased in poured concrete walls: Use rigid steel, intermediate metal conduit, electrical metallic tubing, or PVC conduit. Use masonry sheet-metal boxes. Use flush mounting outlet box in finished areas.
- H. Exposed Dry Locations: In finished areas where concealed installation is not possible, use surface metal raceway systems unless indicated otherwise. In unfinished areas, such as apparatus bays, mechanical, electrical, and similar rooms, use rigid steel, intermediate metal conduit, or electrical metallic tubing. Use only rigid steel or intermediate metal conduit where subject to possible damage or traffic. Use sheet-metal boxes.

1.04 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 3/4-inch conduit for all homerun conduits from panelboards to first supplied device unless specifically noted otherwise.
- 1.05 DELIVERY, STORAGE, AND HANDLING
 - A. Division 1 Materials and Equipment: Product storage and handling requirements.
 - B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- 1.06 COORDINATION
 - A. Division Coordination: Coordination and project conditions.
 - B. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes with architectural elevations and casework shop drawings.

PART 2 PRODUCTS

- 2.01 METAL CONDUIT
 - A. PVC Coated Steel Conduit: ANSI C80.1
 - B. Rigid Steel Conduit: ANSI C80.1.
 - C. Intermediate Metal Conduit (IMC): Rigid steel.
 - D. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.02 FLEXIBLE METAL CONDUIT

- A. Product Description: Interlocked steel construction.
- B. Fittings: NEMA FB 1.
- 2.03 LIQUIDTIGHT FLEXIBLE METAL CONDUIT
 - A. Product Description: Interlocked steel construction with PVC jacket.
 - B. Fittings: NEMA FB 1.
- 2.04 ELECTRICAL METALLIC TUBING (EMT)
 - A. Product Description: ANSI C80.3; galvanized tubing.
 - B. Fittings and Conduit Bodies: NEMA FB 1; steel compression or set screw type.
- 2.05 NONMETALLIC CONDUIT (PVC)
 - A. Product Description: NEMA TC 2; Schedule 40 PVC.
 - B. Fittings and Conduit Bodies: NEMA TC 3.
- 2.06 METAL CLAD CABLE
 - A. Product Description: UL 83 Insulation, UL 4 Flexible interlocked galvanized steel armor, copper conductors.
 - B. Fittings and Conduit Bodies: NEMA TC 3.
- 2.07 SURFACE METAL RACEWAY
 - A. Product Description: Steel surface raceway with painted ivory finish, Wiremold series 3000 or approved equal.
 - B. Fittings: Provide system with all necessary manufactures matching hardware, fitting, and device boxes of adequate depth for a complete and fully operable installation.
- 2.08 OUTLET BOXES
 - A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - B. Wall Plates for Finished Areas: As specified in Section 26 27 26.
 - C. Wall Plates for Unfinished Areas: Provide industrial style cover or device plate.
- 2.09 PULL AND JUNCTION BOXES
 - A. Sheet Metal Boxes: NEMA OS 1, galvanized or painted steel.

B. Pull and Junction Enclosures: Steel, finished in manufacturer's standard enamel finish. Size as required for conduit and cable contained.

2.10 WIREWAY

- A. Product Description: General purpose or Raintight type wireway.
- B. Size: As required or as indicated on Drawings.
- C. Cover: Hinged cover, with full gaskets for exterior locations
- D. Finish: Rust inhibiting primer coating with gray enamel finish

2.11 FLUSH TO GRADE HAND HOLE STYLE SPLICE BOX

- A. Construction: Precast concrete or polymer concrete
- B. Load Rating: UL Tier 5
- C. Cover: Bolt down cover, with system identification logo
- D. UV Degradation per ASTM G-53
- E. Chemical Resistance per ASTM D-543
- F. Impact Resistance per ASTM D-2444
- G. Available Manufacture: Strongwell Quazite, PG series or equivalent

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Division 1 Coordination: Coordination and project conditions.
 - B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.02 INSTALLATION

- A. Ground and bond raceway and boxes under provisions of Section 26 02 26 and NEC. Provide ground lug bushings on ends of all feeder conduits and bond to terminating enclosure equipment grounding point. Size bonding conductor per NEC table 250-122 relative to feeder overcurrent protective device rating.
- B. Fasten raceway and box supports to structure and finishes under provisions of Section 26 05 03.

- C. Identify circuits contained within junction boxes with adhesive labels per section 26 05 53 or by neatly handwriting circuit identification with a permanent black marker on exposed side of box cover.
- D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.03 INSTALLATION-RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route as required to complete wiring system.
- B. Arrange raceway supports to prevent misalignment during wiring installation.
- C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 03; provide space on each for 25 percent additional raceways.
- E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach raceway to ceiling support wires or other piping systems.
- G. Route exposed raceway parallel and perpendicular to walls.
- H. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
- I. Touch up paint damaged finish on surface raceway with manufacturer's matching paint.
- J. Maintain adequate clearance between raceway and piping.
- K. Maintain 12-inch clearance between raceway and surfaces with temperatures exceeding 100 degrees F.
- L. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- M. Bring conduit to shoulder of fittings; fasten securely.
- N. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- O. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams.
- P. Provide suitable fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
- Q. Provide suitable pull string or cord in each empty raceway except sleeves and nipples.

- R. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- S. Paint all exposed conduits in finished areas to match surface to which it is attached.

3.04 INSTALLATION-BOXES

- A. Set wall mounted boxes at elevations to accommodate mounting as indicated on the Drawings, or as necessary to accommodate conditions.
- B. Orient boxes to accommodate wiring devices oriented as indicated on the Drawings.
- C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- D. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Where possible, provide minimum 24 inches separation in acoustic rated walls.
- E. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- F. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- G. Use adjustable steel channel fasteners for hung ceiling outlet box.
- H. Do not fasten boxes to ceiling support wires or other piping systems.
- I. Support boxes independently of conduit.
- J. Use multi-gang box where more than one device is mounted together. Do not use sectional boxes.
- K. Use double gang box with single device plaster ring for single device outlets.

3.05 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance UL listing and requirements.
- B. Align adjacent wall mounted outlet boxes for receptacles, data outlets, and similar devices.

3.06 ADJUSTING

- A. Division 1 Quality Control: Testing, adjusting, and balancing.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused openings in boxes.

3.07 CLEANING

- A. Division 1 Contract Close-out Procedures: Final cleaning.
- B. Clean interior of boxes to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.

SECTION 26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Nameplates.
 - 2. Labels.
 - 3. Wire markers.
 - 4. Underground Warning Tape.

1.02 ENVIRONMENTAL REQUIREMENTS

A. Install labels only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 PRODUCTS

- 2.01 NAMEPLATES
 - A. Product Description: Laminated three-layer plastic with engraved black letters on contrasting background color.
 - B. Letter Size:
 - 1. 1/8-inch-high letters for identifying individual equipment and loads.
 - 2. 1/4-inch-high letters for identifying grouped equipment and loads, panelboards and distribution equipment.
 - C. Minimum nameplate thickness: 1/8 inch.

2.02 ADHESIVE LABELS:

- A. Machine printed and laminated adhesive tape, with 3/16-inch black letters on clear background, using 'Dymo' series 5500 label production equipment or equivalent. If necessary to accommodate the limited space provided for data jack identification, the letter size may be adjusted accordingly.
- 2.03 WIRE MARKERS
 - A. Description: Cloth tape, split sleeve, or tubing type wire markers.
 - B. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number.

2. Control Circuits: Control wire number as indicated on schematic and interconnection diagrams.

2.04 CONDUIT AND RACEWAY IDENTIFICATION

A. Description: Using permanent marker, neatly handwrite nominal voltage and branch circuits contained in each junction or pull box on exposed side of box cover.

2.05 UNDERGROUND WARNING TAPE

A. Description: 4-inch-wide plastic tape, detectable type, colored red or yellow with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install identifying devices after completion of painting.
- B. Nameplate Installation:
 - 1. Install nameplate parallel to equipment lines.
 - 2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners.
 - 3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners.
 - 4. Secure nameplate to equipment front using screws or rivets.
 - 5. Install nameplates for the following:
 - a) Panelboards: Provide engraved nameplate.
 - b) Enclosed Circuit Breakers, disconnects, motor starters and similar control equipment: Provide engraved nameplate. Nameplate shall include description of load supplied and supply circuit and origin.
 - c) Wiring devices such as switches, fractional horsepower motor starter switches, and receptacles: Provide adhesive label. Label shall include supply circuit and origin and load controlled. For example:

UH 1	
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d) Wire Marker Installation: Wires and cables: Provide wire marker at each junction and within 6" of termination at wiring devices and panelboards.

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For power circuits indicate branch circuit or feeder number. For neutral conductors indicate branch circuit supplied. For control circuits indicate wire number indicated on schematic and interconnection diagrams or shop drawings.

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e) Underground Warning Tape Installation: Install underground warning tape along length of each underground conduit, raceway, or cable 6 to 8 inches below finished grade, directly above buried conduit, raceway, or cable.
SECTION 26 09 19

ENCLOSED CONTACTORS

- PART 1 GENERAL
- 1.01 SUMMARY
 - A. Section includes enclosed contactors for lighting and general purposes as indicated on the drawings.

1.02 REFERENCES

- A. NEMA ICS 2 (National Electrical Manufacturers Association) Starters, Contactors, and Overload Relays Rated Not More Than 2000 Volts AC or 750 Volts DC.
- B. NEMA ICS 5 (National Electrical Manufacturers Association) Industrial Control and Systems: Control Circuit and Pilot Devices.
- C. NEMA ICS 6 (National Electrical Manufacturers Association) Industrial Control and Systems: Enclosures.
- D. NETA ATS (International Electrical Testing Association) Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.03 SUBMITTALS

- A. Division 1 Shop Drawings, Product Data and Samples.
- B. Product Data: Submit dimensioned drawing depicting physical layout of components, data sheets for components, wiring diagrams, voltage ratings, and current ratings.

1.04 CLOSEOUT SUBMITTALS

- A. Division 1 Contract Close-out Procedures.
- B. Project Record Documents: Record actual locations and ratings of enclosed contactors.
- C. Operation and Maintenance Data: Submit instructions for replacing and maintaining coil and contacts. Provided wiring diagram in clear protective cover in inside of enclosure, including circuit identifications and specific loads served. Identify all wiring on diagram, corresponding to identification numbers of both factory and field installed wiring.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.01 CONTACTORS

- A. Manufacturers:
 - 1. Square D
 - 2. Cutler Hammer (Eaton)
 - 3. General Electric
 - 4. Substitutions: Division 1 Product Options and Substitutions.
- B. Product Description: NEMA ICS 2, AC general purpose mechanically held magnetically operated contactor. Configuration and components as detailed on the drawings. Complete assemblies shall be UL Listed.
- C. Coil operating voltage: As indicated on the drawings.
- D. Poles: As required to match circuit configuration and control function.
- E. Product Features:
 - 1. Indicating Light: LED lamp with lens color as indicated on the drawings.
 - 2. Auxiliary Contacts: One field convertible in addition to seal-in contact.
 - 3. Reference Drawing for additional requirements
- F. Enclosure: NEMA ICS 6, as required to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
 - 1. Interior Dry Locations: Type 1.

PART 3 EXECUTION

- 3.01 INSTALLATION
 - A. Install enclosed contactors where indicated, maintaining required clearances to all adjacent equipment.
 - B. Install enclosed contactors plumb. Provide supports in accordance with Section 26 05 29.
 - C. Provide engraved plastic nameplates; refer to Section 26 05 53 for product requirements and location.
- 3.02 FIELD QUALITY CONTROL
 - A. Division 1 Quality Requirements.

PAGE 1 OF 4

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes distribution and branch circuit panelboards.

1.02 REFERENCES

- A. UL 67 Panelboards
- B. UL 50 Cabinets and boxes
- C. NECA (National Electrical Contractors Association) -Standard of Installation
- D. NEMA AB 1 (National Electrical Manufacturers Association) Molded Case Circuit Breakers.
- E. NEMA PB 1 (National Electrical Manufacturers Association) Panelboards.
- F. NEMA PB 1.1 (National Electrical Manufacturers Association) Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- G. NETA ATS (International Electrical Testing Association) Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

1.03 SUBMITTALS

- A. Division 1 Shop Drawings, Product Data and Samples
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker arrangement and sizes.
- C. Product Data: Submit catalog data showing specified features of standard products.

1.04 CLOSEOUT SUBMITTALS

- A. Division 1 Contract Close-out Procedures.
- B. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.
- C. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

QUALIFICATIONS

D. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

- E. The manufacturer of the panelboard shall be the manufacturer of the major components within the assembly, including circuit breakers and fusible switches.
- F. For the equipment specified herein, the manufacturer shall be ISO 9000, 9001 or 9002 certified.

1.05 MAINTENANCE MATERIALS

- A. Division 1 Contract Closeout 01 73 00 Operation and Maintenance Data: Requirements for maintenance products.
- B. Provide two of each panelboard keys per 01 75 00 Spare Parts and Maintenance Materials. All panelboards shall be keyed alike.

PART 2 PRODUCTS

2.01 DISTRIBUTION PANELBOARDS

- A. Manufacturers:
 - 1. Square D
 - 2. Cutler-Hammer
 - 3. General Electric
 - 4. Substitutions: Division 1 Substitutions.
- B. Product Description: NEMA PB 1, circuit breaker type distribution panelboard.
- C. Panelboard Bus: Main bus bars shall be copper sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum.
- D. Minimum integrated short circuit rating: as indicated.
- E. Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
- F. Enclosure: NEMA PB 1, Type 1.
- G. Cabinet Box: 8 inches deep, 36" inches wide minimum (nominal).
- H. Cabinet Front: Surface "Door in door" dual hinged doors to provide access to the wiring gutters without requiring removal of the trim. Provide with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

2.02 BRANCH CIRCUIT PANELBOARDS

- A. Manufacturers:
 - 1. Square D
 - 2. Cutler-Hammer
 - 3. General Electric
 - 4. Substitutions: Division 1 Substitutions.
- B. Product Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
- C. Main bus bars shall be copper sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum.
- D. A bolted ground bus shall be included in all panels.
- E. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection.
- F. Minimum Integrated Short Circuit Rating: As indicated.
- G. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, type HID breakers for high intensity discharge lighting circuits, and type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.
- H. Enclosure: NEMA PB 1, Type 1
- I. Cabinet Box: 6 inches deep, 20 inches wide (nominal).
- J. Cabinet Front: Surface "Door in door" dual hinged doors to provide access to the wiring gutters without requiring removal of the trim. Provide with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1 and the NECA "Standard of Installation."
- B. Install panelboards plumb.

- C. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
- D. Provide filler plates for unused spaces in panelboards.
- E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads. Submit copy of final panelboard directories in both hardcopy and electronic format.
- F. Provide engraved plastic nameplates under the provisions of Section 26 05 53.
- G. Provide spare conduits out of each recessed panelboard to an accessible location above local accessible above ceiling space. Minimum spare conduits: 1 empty 3/4-inch conduit for each three spare circuit breakers and/or spaces in panelboard.
- H. Provide field accurate one-line drawings and panel location maps mounted on or adjacent to main distribution panel. Mount drawing under Plexiglas or another clear polycarbonate protective lens with suitable frame.

3.02 FIELD QUALITY CONTROL

- A. Division 1 Quality Control, Division 1– Contract Close-out Procedures.
- B. Perform circuit breaker inspections and tests as follows:
 - 1. Visual and Mechanical Inspection
 - a) Compare nameplate data with drawings and specifications.
 - b) Inspect circuit breaker for correct mounting.
 - c) Operate circuit breaker to insure smooth operation.
 - d) Inspect case for cracks or other defects.
 - e) Inspect all bolted electrical connections for high resistance by verifying tightness of accessible bolted electrical connections by calibrated torquewrench method in accordance with manufacturer's published data.

3.03 ADJUSTING

- A. Division 1– Contract Close-out Procedures.
- B. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

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SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes switches, receptacles, surface device raceway and device plates.
 - B. Related Sections:
 - 1. Section 26 05 53 Identification for Electrical Systems.
 - 2. Section 26 05 33 Raceway and Boxes for Electrical Systems.

1.02 REFERENCES

- A. NEMA WD 1 (National Electrical Manufacturers Association) General Requirements for Wiring Devices.
- B. NEMA WD 5 (National Electrical Manufacturers Association) Specific Requirements for Wiring Devices.
- C. NEMA WD 6 (National Electrical Manufacturers Association) Wiring Device - Dimensional Requirements.

1.03 SUBMITTALS

- A. Division 1 Shop Drawings, Product Data and Samples.
- B. Product Data: Submit manufacturer's catalog information showing dimensions, materials, colors and configurations.

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.

PART 2 PRODUCTS

- 2.01 WALL SWITCHES
 - A. Manufacturers:
 - 1. Arrow Hart Wiring Devices
 - 2. Hubble
 - 3. Leviton
 - 4. Pass-Seymore

- 5. Substitutions: Division 1 Substitutions.
- B. Product Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch.
- C. Body and Handle: Ivory plastic with toggle handle.
- D. Pilot Light Switch: Lighted handle type switch; red color handle.
- E. Ratings: Match branch circuit and load characteristics.

2.02 WALL DIMMERS

- A. Manufacturers:
 - 1. Lutron
 - 2. Hubble
 - 3. Leviton
 - 4. Substitutions: Division 1 Substitutions.
- B. Product Description: NEMA WD 1; Semiconductor dimmer suitable for use low voltage incandescent fixtures supplied.
- C. Body and Handle: Ivory plastic with linear slide.
- D. Voltage: 120 volts.
- E. Power Rating: Match branch circuit and load characteristics.

2.03 RECEPTACLES

- A. Manufacturers:
 - 1. Arrow Hart Wiring Devices
 - 2. Hubble
 - 3. Leviton
 - 4. Pass-Seymore
 - 5. Substitutions: Division 1 Substitutions.
- B. Product Description: NEMA WD 1, Heavy-duty general use receptacle.
- C. Device Body: Ivory plastic face.
- D. Configuration: NEMA WD 6, type as specified and indicated.
- E. Convenience Receptacle: Type 5-20.
- F. GFCI Receptacle: Convenience receptacle with integral Class A ground fault circuit interrupter to meet regulatory requirements.

- G. Specific Use Receptacle Configuration: NEMA WD1 or WD 5; Type as indicated on Drawings, with black phenolic face.
- 2.04 WALL PLATES
 - A. Manufacturers:
 - 1. Arrow Hart Wiring Devices
 - 2. Hubble
 - 3. Leviton
 - 4. Pass-Seymore
 - 5. Substitutions: Division 1 Product Options or Substitutions, or Approved Equal.
 - B. Decorative Cover Plate: 430 brushed stainless steel, configuration to match devices installed.
- 2.05 CORD REELS
 - A. Manufacturers:
 - 1. Aero Motive
 - 2. Daniel Woodheed
 - 3. Reel Craft
 - 4. Substitutions: Division 1 Product Options or Substitutions, or Approved Equal.
 - B. Description:
 - 1. Mounting: Rigid or swivel ceiling mount.
 - 2. Connection: Cord and plug connection.
 - 3. Reel: Springe return with adjustable tension and ratchet.
 - 4. Cord: 35' length, 3 #12 AWG heavy duty cord with duplex receptacle end.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Division 1 Coordination: Coordination and project conditions.
 - B. Verify with Architectural elevations and casework shop drawings that outlet boxes are installed at proper height.

- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.02 PREPARATION

A. Clean debris from outlet boxes.

3.03 INSTALLATION

- A. Install devices plumb and level.
- B. Touch up paint damaged finish on surface raceway with manufacturer's matching paint.
- C. Install receptacles with grounding pole on bottom.
- D. Connect wiring device grounding terminal to outlet box with bonding jumper or other approved means, and branch circuit equipment grounding conductor.
- E. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- F. Connect wiring devices by wrapping solid conductor around screw terminal.
- G. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- H. Identify all devices in compliance with the provisions of Section 26 05 53.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Where casework is installed, locate switches, receptacles and data outlets at counters 4 inches above back splash of counter, unless otherwise noted.
- B. Where possible, install switches and other control devices 48 inches (to center) above finished floor, unless otherwise noted.
- C. Where possible, install convenience receptacles and data outlets 24 inches (to center) above finished floor, unless otherwise noted.
- D. Where devices are installed in concrete walls, device mounting height may be adjusted so that cutting of only one block may be required.
- E. Coordinate with Owner's on-site representative for exact placement where conflict may exist with equipment or furnishings.

3.05 FIELD QUALITY CONTROL

A. Division 1 – Contract Close-out Procedures.

- B. Inspect each wiring device for defects and proper secure mounting.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.06 ADJUSTING

- A. Division 1– Contract Closeout Procedures.
- B. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

- A. Division 1 Final Cleaning.
- B. Clean exposed surfaces to remove splatters and restore finish.

PAGE 1 OF 3

SECTION 26 18 16.13

ENCLOSED CIRCUIT BREAKERS

PART 1 GENERAL

- 1.01 SECTION INCLUDES
 - A. Thermal Magnetic Molded Case Circuit Breakers Furnish as specified herein and where shown on the associated drawing.
- 1.02 REFERENCES: THE CIRCUIT BREAKERS REFERENCED HEREIN SHALL BE DESIGNED AND MANUFACTURED ACCORDING TO THE LATEST ADOPTED REVISION OF THE FOLLOWING STANDARDS.
 - A. NEMA AB 1 (National Electrical Manufacturers Association) Molded Case Circuit Breakers and Molded Case Switches
 - B. UL 489 (Underwriters Laboratories Inc.) Molded Case Circuit Breakers and Circuit Breaker Enclosures
 - C. Federal Specification W-C-375B/GEN Circuit Breakers, Molded Case; Branch Circuit and Service
 - D. National Fire Protection Association NFPA 70 (National Electrical Code)

1.03 SUBMITTALS

A. Provide outline drawings with dimensions, and ratings for voltage, amperage and maximum interruption. Include instructions for identification and receiving inspection, circuit breaker mounting, trip unit functions and adjustments, trouble shooting, accessories and wiring diagrams.

1.04 QUALIFICATIONS

A. Manufacturer shall furnish products listed by Underwriters Laboratories Incorporated (UL), or testing firm acceptable to the authority having jurisdiction as suitable for application specified. The overcurrent protection device manufacturing facility shall be Registered by Underwriters Laboratories Inc. to the International Organization for Standardization ISO 9000 Series Standards for quality.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Shall be by same manufacture as Switchboards and Panelboards.
- 2.02 MOLDED CASE CIRCUIT BREAKERS
 - A. Molded Case Circuit Breaker Characteristics General

- 1. Circuit breakers shall be constructed using glass reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- 2. Circuit breakers shall have an over center, trip free, toggle operating mechanism which will provide quick-make, quick-break contact action. The circuit breaker shall have common tripping of all poles.
- 3. The circuit breaker handle shall reside in a tripped position between ON and OFF to provide local trip indication. Circuit breaker escutcheon shall be clearly marked ON and OFF in addition to providing International I/O markings.
- 4. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker.
- 5. Circuit breakers shall be factory sealed and shall have date code on face of circuit breaker.
- 6. Circuit breaker shall be fully rated for fault currents indicated.
- 7. Circuit breakers shall be equipped with UL Listed electrical accessories as noted on the associated drawings. Where indicated, circuit breaker handle accessories shall provide provisions for locking handle in the ON and OFF position.
- 8. All circuit breakers shall be UL Listed for reverse connection without restrictive line and load markings and be suitable for mounting in any position.
- All lugs shall be UL Listed to accept solid (not larger than #8 AWG) and/or stranded copper conductors. Lugs shall be suitable for 75° C rated wire or 90° C rated wire, sized according to the 75° C temperature rating in the National Electrical Code.
- B. Thermal-Magnetic Circuit Breakers
 - 1. Circuit breakers shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.
 - 2. Thermal trip elements shall be factory preset and sealed. Circuit breakers shall be true rms sensing and thermally responsive to protect circuit conductor(s) in a 40° C ambient temperature.
 - 3. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker.
 - 4. Standard circuit breakers up to 250 amperes shall be UL Listed as HACR where shown to supply motor loads.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install circuit breakers in accordance with manufacturer's instructions, the National Electrical Code and applicable local codes.

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SECTION 26 28 16.16 ENCLOSED SWITCHES

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes fusible and non-fusible switches.

1.02 REFERENCES

- A. NEMA FU1 (National Electrical Contractors Association). Low Voltage Cartridge Fuses.
- B. NEMA KS 1 (National Electrical Contractors Association). Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- C. NETA ATS (International Electrical Testing Association) Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

1.03 SUBMITTALS

- A. Division 1 Shop Drawing, Product Data and Samples.
- B. Product Data: Submit switch ratings and enclosure dimensions.

1.04 CLOSEOUT SUBMITTALS

- A. Division 1 Contract Close-out Procedures.
- B. Project Record Documents: Record actual locations of enclosed switches and ratings of installed fuses.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 FUSIBLE SWITCH ASSEMBLIES

- A. Manufacturers:
 - 1. Square D
 - 2. Cutler Hammer (Eaton)
 - 3. General Electric
 - 4. Substitutions: Division 1 Product Options or Substitutions, or approved equal.

- B. Product Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position.
- C. Fuse clips: Designed to accommodate NEMA FU 1, Class R fuses.
- D. Enclosure: NEMA KS 1, as required to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
 - 1. Interior Dry Locations: Type 1.
 - 2. Interior damp locations: Type 3R.
 - 3. Exterior Locations: Type 3R.
- E. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.
- F. Furnish switches with entirely copper current carrying parts.

2.02 NON-FUSIBLE SWITCH ASSEMBLIES

- A. Manufacturers:
 - 1. Square D
 - 2. Cutler Hammer (Eaton)
 - 3. General Electric
 - 4. Substitutions: Division 1 Product Options or Substitutions, or approved equal.
- B. Product Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position.
- C. Enclosure: NEMA KS 1, as required to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
 - 1. Interior Dry Locations: Type 1.
 - 2. Interior damp locations: Type 3R.
 - 3. Exterior Locations: Type 3R.
- D. Switches shall have all copper current carrying parts.
- 2.03 SWITCH RATINGS
 - A. Switch Rating: Horsepower or ampere rated for load as indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install enclosed switches plumb. Provide supports in accordance with Section 26 05 29.
- B. Height: 5 ft to operating handle.
- C. Locate and install engraved plastic nameplates under the provisions of Section 26 05 53.
- D. Provide properly sided fuses in all fused switches.
- E. Spare parts: Provide three spares of each size and rating of fuse installed on this project.

3.02 FIELD QUALITY CONTROL

A. Division 1 –Contract Close-out Procedures.

- SECTION 26 29 13 ENCLOSED CONTROLLERS
- PART 1 GENERAL
- 1.01 SUMMARY
 - A. Section includes fusible and non-fusible switches.

1.02 REFERENCES

- A. NEMA FU1 (National Electrical Contractors Association). Low Voltage Cartridge Fuses.
- B. NEMA KS 1 (National Electrical Contractors Association). Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- C. NETA ATS (International Electrical Testing Association) Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

1.03 SUBMITTALS

- A. Division 1 Shop Drawings, Product Data and Samples.
- B. Product Data: Submit switch ratings and enclosure dimensions.

1.04 CLOSEOUT SUBMITTALS

- A. Division 1 Contract Close-out Procedures.
- B. Project Record Documents: Record actual locations of enclosed switches and ratings of installed fuses.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 FUSIBLE SWITCH ASSEMBLIES

- A. Manufacturers:
 - 1. Square D
 - 2. Cutler Hammer (Eaton)
 - 3. General Electric
 - 4. Substitutions: Division 1 Product Options or Substitutions, or approved equal.

- B. Product Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position.
- C. Fuse clips: Designed to accommodate NEMA FU 1, Class R fuses.
- D. Enclosure: NEMA KS 1, as required to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
 - 1. Interior Dry Locations: Type 1.
 - 2. Interior damp locations: Type 3R.
 - 3. Exterior Locations: Type 3R.
- E. Service Entrance: Switches identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.
- F. Furnish switches with entirely copper current carrying parts.

2.02 NON-FUSIBLE SWITCH ASSEMBLIES

- A. Manufacturers:
 - 1. Square D
 - 2. Cutler Hammer (Eaton)
 - 3. General Electric
 - 4. Substitutions: Division 1 Product Options or Substitutions, or approved equal.
- B. Product Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position.
- C. Enclosure: NEMA KS 1, as required to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
 - 1. Interior Dry Locations: Type 1.
 - 2. Interior damp locations: Type 3R.
 - 3. Exterior Locations: Type 3R.
- D. Switches shall have all copper current carrying parts.
- 2.03 SWITCH RATINGS
 - A. Switch Rating: Horsepower or ampere rated for load as indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install enclosed switches plumb. Provide supports in accordance with Section 26 05 29
- B. Height: 5 ft to operating handle.
- C. Locate and install engraved plastic nameplates under the provisions of Section 26 05 53.
- D. Provide properly sided fuses in all fused switches.
- E. Spare parts: Provide three spares of each size and rating of fuse installed on this project.

3.02 FIELD QUALITY CONTROL

A. Division 1 – Quality Control, Contract Close-out Procedures.

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SECTION 26 51 00

INTERIOR LIGHTING

PART 1 – GENERAL

- 1.01 SUMMARY
 - A. Section includes interior luminaires, lamps, ballasts, and accessories.
 - B. Related Sections:
 - 1. Section 26 56 00 Exterior Lighting
 - 2. Section 26 52 00 Emergency Lighting.

1.02 REFERENCES

- A. ANSI C82.1 Ballasts for Fluorescent Lamps Specifications.
- B. ANSI C82.4 Ballasts for High-Intensity Discharge Lamps (Multiple Supply Type).

1.03 SUBMITTALS

- A. Division 1 Shop Drawings, Product Data and Samples.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Submit dimensions, ratings, and performance data. Provide manufacture and model number for each different type of fixture ballasts.

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.05 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

- 2.01 INTERIOR LUMINAIRES
 - A. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as required for complete installation and proper operation and as specified on the drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Unless specified otherwise, install suspended luminaries using steel conduit pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height. Provide seismic restraint where necessary.
- B. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- C. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- D. Install recessed luminaires to permit removal from below.
- E. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- F. Install clips to secure recessed grid-supported luminaires in place. Provide auxiliary support from fixtures installed in grid ceilings to structure above, to completely suspend fixture upon grid failure in compliance with local requirements.
- G. Install wall-mounted luminaires at height indicated.
- H. Coordinate installation of under cabinet and display case lighting with casework shop drawings and architectural elevations.
- I. Install accessories furnished with each luminaire.
- J. Connect luminaires to branch circuit outlets provided under Section 26 05 33. Wiring to each fixture shall originate at a junction box; fixture to fixture wiring will not be acceptable.
- K. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- L. Install specified lamps in each luminaire.
- M. Ground and bond interior luminaires under the provisions of Section 26 02 26.

3.02 FIELD QUALITY CONTROL

- A. Division 1 Contract Close-out Procedures.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.
- 3.03 ADJUSTING
 - A. Division 1 Contract Close-out Procedures: Testing, adjusting, and balancing.
 - B. Aim and adjust luminaires as directed.

3.04 CLEANING

- A. Division 1 Contract Closeout: Final cleaning.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

3.05 PROTECTION OF FINISHED WORK

- A. Division 1 Contract Close-out Procedures: Protecting finished work.
- B. Revamp all fixtures used for construction illumination prior to substantial acceptance. Replace any lamps that have failed at time of final acceptance.

SECTION 26 52 00	EMERGENCY LIGHTING

PART 1 GENERAL

- 1.01 SUMMARY
 - A. Section includes emergency lighting units and exit signs.

1.02 REFERENCES

- A. NFPA 101 Life Safety Code
- B. NEMA WD 6 (National Electrical Manufacturers Association) Wiring Devices-Dimensional Requirements.
- 1.03 SYSTEM DESCRIPTION
 - A. Emergency lighting to comply with UBC, NFPA, and NEC requirements.

1.04 SUBMITTALS

- A. Division 1 Shop Drawings, Product Data and Samples
- B. Product Data: Submit dimensions, ratings, and performance data.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

- 2.01 EXIT SIGNS
 - A. Manufacturers:
 - 1. As Scheduled on Drawings
 - B. Product Description: LED illuminated exit sign.

PART 3 EXECUTION

- 3.01 INSTALLATION
 - A. Install surface-mounted emergency lighting units and exit signs plumb and adjust to align with building lines and with each other. Fasten securely to prevent movement.
 - B. Provide wall mounting instead of ceiling mounting where ever possible. Install wallmounted emergency lighting units and exit signs at height as scheduled. Coordinate exact mounting height of exit signs directly above doorways.

- C. Install accessories furnished with each emergency lighting unit and exit sign.
- D. Connect emergency lighting units to branch circuits as indicated.
- E. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within unit.
- F. Install specified lamps in each emergency lighting unit.
- 3.02 FIELD QUALITY CONTROL
 - A. Division 1 Quality Controls and Contract Close-out Procedures.
 - B. Operate each unit after installation and connection. Inspect for proper connection and operation.

3.03 ADJUSTING

- A. Division 1 Contract Close-out Procedures.
- B. Aim and adjust lamp fixtures to maximize uniform illumination of exit pathways.
- C. Position exit sign directional arrows as indicated.
- 3.04 PROTECTION OF FINISHED WORK
 - A. Division 1 Contract Close-out Procedures..
 - B. Relamp emergency lighting units that have failed prior to final acceptance.

SECTION 26	56 00
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EXTERIOR LIGHTING

- PART 1 GENERAL
- 1.01 SUMMARY
 - A. Section includes exterior luminaries and accessories.

1.02 REFERENCES

- A. ANSI C82.4 Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
- B. Institute of Transportation Engineers (ITE) guidelines.
- C. Manual on Uniform Traffic Control Devices (MUTCD).

1.03 SUBMITTALS

- A. Division 1 Shop Drawings, Project Data and Samples.
- B. Shop Drawings: Indicate dimensions and components for each luminaire which is not a standard product of the manufacturer.
- C. Product Data: Submit dimensions, ratings, and performance data.
- D. Submit calculations to substantiate pole selection.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- 1.05 DELIVERY, STORAGE, AND HANDLING
 - A. Division 1 Storage and Protection.

1.06 COORDINATION

- A. Division 1 Coordination: Coordination and project conditions.
- B. Furnish bolt templates and pole mounting accessories for installer of pole foundations.
- C. Coordinate exact pole base locations to avoid conflict with other site systems.

PART 2 PRODUCTS

2.01 LUMINARIES

A. Product Description: Complete exterior luminaire assemblies, with features, options, and accessories as scheduled and as required for complete installation and proper operation and as indicated on the design drawings.

2.02 METAL POLES

- A. As selected by fixture manufacturer.
- B. Material and Finish:
 - 1. Shape: Square straight steel or aluminum.
 - 2. Finish: Corrosion resistant finish to match luminaires.
- C. Accessories:
 - 1. Handhole.
 - 2. Anchor bolts.
 - 3. Bolt Cover.
 - 4. Pole top cap
- D. Loading Capacity Ratings:
 - 1. Luminaire Weight: As provided by manufacturer.
 - 2. Luminaire and Bracket Effective Projected Area: As provided by manufacturer.
 - 3. Steady Wind: 110 miles per hour, minimum, with gusts to 145 miles per hour under configuration installed.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Division 1 Coordination: Coordination and Project conditions.
 - B. Verify foundations are ready to receive fixtures.

3.02 INSTALLATION

- A. Provide concrete bases for lighting poles at locations indicated, under the provisions of Division 3 Cast in Place Concrete. Coordinate exact location with other systems.
- B. Install poles plumb. Provide double nuts to adjust plumb. Grout around and under each base after leveling is complete.
- C. Install lamps in each luminaire.
- D. Bond and ground luminaries, metal accessories and metal poles under the provisions of Section 26 02 26.
- 3.03 FIELD QUALITY CONTROL
 - A. Division 1 Quality Control and Contract Close-out Procedures.

B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.04 CLEANING

- A. Division 1: Final Cleaning.
- B. Clean photometric control surfaces using materials and methods as recommended by manufacturer.
- C. Clean finishes and touch up damaged paint.
- 3.05 PROTECTION OF FINISHED WORK
 - A. Division 1 Contract Closeout Procedures.
 - B. Repair damaged luminaire and pole finish at completion of work. Prepare surface and employ materials to provide appearance and corrosion resistance equivalent to that of the original finish.

SECTION 27 13 42 COMMUNICATIONS SERVICES CABLING

PART 1 – GENERAL

- 1.01 SUMMARY
 - A. Provide the equipment, materials, and labor to install the systems shown on the drawings and specified herein. This shall include (but not be limited to) provision of all raceways, sleeves, boxes, line and low voltage wire and cable, patch cords, pull ropes (in unused conduits), panels, outlets, jacks, connections, cable management, labeling, testing and all other material, equipment, and labor required to make the systems fully operational.
 - B. Related Sections:
 - 1. Division 07 Thermal and Moisture Protection
 - 2. Section 26 01 00 Operation and Maintenance of Electrical Systems.
 - 3. Section 26 05 33 Raceway and Boxes for Electrical Systems.
 - 4. Section 26 27 26 Wiring Devices.
- 1.02 COORDINATION
 - A. The necessity to coordinate this work with the Owner and the Contracting Agency is emphasized. The Contractor shall be responsible for any omissions, delays and additional cost due to lack of coordination or approval from the same in accordance with the latest Cat 5e standards.

1.03 CODES AND STANDARDS

- A. Where a Nationally Recognized Testing Laboratory (NRTL) listing or classification exists for a product and the product is suitable for the purpose specified and indicated, the product shall bear the appropriate marking indicating the listing or classification.
- B. Where a UL Standard is in effect, equipment shall:
 - 1. Meet that Standard and bear the UL Label.

1.04 REFERENCE CODES AND STANDARDS

- A. Design, manufacture, test, and install telecommunications cabling networks per manufacturer's requirements and in accordance with NFPA-70 (National Electrical Code®), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards:
 - 1. ANSI/TIA/EIA-568-A -- Commercial Building Telecommunications Cabling
 - 2. ANSI/TIA/EIA-568-A-1 -- Propagation Delay and Delay Skew Specifications for 100 ohm 4-pair Cable
- 3. ANSI/TIA/EIA-568-A-2 Commercial Building Standards Update
- 4. ANSI/TIA/EIA-568-A-4 Testing of patch cords
- 5. ANSI/TIA/EIA-568-A-5 Category 5E components, basic links and channels (latest draft)
- 6. ANSI/TIA/EIA-569-A -- Commercial Building Standard for Telecommunications Pathways and Spaces
- 7. ANSI/TIA/EIA-526-14A: OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- 8. ANSI/TIA/EIA-606 -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- 9. ANSI/TIA/EIA-607 -- Commercial Building Grounding and Bonding Requirements for Telecommunications
- 10. ANSI/TIA/EIA TSB-67 -- Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems
- 11. ANSI/TIA/EIA TSB-75 -- Additional Horizontal Cabling Practices for Open Offices
- 12. ANSI/TIA/EIA TSB 95 -- New parameters to support Gigabit Ethernet
- B. Install cabling in accordance with the most recent edition of BICSI® publications:
 - 1. BICSI -- Telecommunications Distribution Methods Manual
 - 2. BICSI -- Cabling Installation Manual
- C. Federal, state, and local codes, rules, regulations, and ordinances governing the work, are as fully part of the specifications as if herein repeated or hereto attached. If the contractor should note items in the drawings or the specifications, construction of which would be code violations, promptly call them to the attention of the owner's representative in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

1.05 REGULATORY REQUIREMENTS

- A. All Work shall conform to the requirements of NFPA 70.
- B. All Work shall conform to the requirements of all Federal, State and Local Electrical and Telecommunications Regulations.

1.06 SUBMITTALS

A. The following shall be submitted in accordance with Division 1 in enough detail to show full compliance with the specification:

- B. Manufacturer's Catalog Data shall be submitted for the following items. Data shall include a complete list of parts, special tools, and supplies with current unit prices and source of supply.
 - 1. Copper Cable
 - 2. Copper Modular Jack
 - 3. Patch Panels
 - 4. Wire Management
 - 5. Information Outlets
 - 6. Cable Support Devices
 - 7. Racks
 - 8. Patch Cords
- C. System Identification:
 - 1. Submit sample telecom outlet with jack identification labeling printed and installed per this specification.
- D. Quality Assurance Plan:
 - 1. Contractor shall prepare a quality assurance plan which provides a detailed outline of all testing to be accomplished. Quality assurance plan shall include, as a minimum, a schedule of when tests will be performed relative to installation milestones, specific test procedures that will be used, a list of test equipment that will be used including manufacturer, model number, calibration certification, range and resolution accuracy. Test plan shall be submitted to the Owner for approval at least 30 days prior to the start of testing.
- E. SHOP DRAWINGS
 - 1. Work shall be laid out in advance. Shop drawings shall be submitted for approval before work begins.
 - 2. Shop Drawings shall include:
 - a) Dimensioned layout of major pathways, including j-hooks, sleeves, cable trays and large conduits (2" and larger.) and location of all fire wall penetrations.
 - b) Plan drawings as same or larger scale than Contract Drawings, indicating locations and identification of work area outlets, nodes, telecommunications closets (IDFs), and backbone (riser) cable runs.

- c) Provide enlarged details for telecommunications equipment rooms. Provide elevation views of each equipment rack indicating equipment and termination detail.
- d) Labeling documentation.

1.07 WORKMANSHIP

- A. Components of the system shall be installed in a neat, workmanlike manner. Wiring color codes shall be strictly observed, and terminations shall be uniform throughout the system. Identification markings and systems shall be uniform. TIA/EIA 568B wiring codes as shown on the drawings shall standardize all wiring
- B. Install materials and equipment in accordance with applicable standards, codes, requirements, and recommendations of national, state, and local authorities having jurisdiction, and National Electrical Code® (NEC) and with manufacturer's printed instructions

1.08 QUALITY ASSURANCE

- A. Perform all Work in accordance with all regulatory rules and regulations as well as references in this specification.
- B. Perform all Testing in accordance with ANSI/TIA/EIA-568-A and ANSI/TIA/EIA-TSB 67, and TSB 95 and Category 5e specifications and submit all printed reports.

1.09 QUALIFICATIONS

A. The telecommunications work specified in this Section is acknowledged to require special skills mastered by education, experience, or both.

1.10 TERMINOLOGY

- A. "TDS" shall refer to the Telecommunication Distribution System cabling and hardware infrastructure internal and external to a building or buildings used to transmit voice and data, etc.
- B. "Stations" shall refer to individual telephone or computers, or remote peripherals of those systems (e.g., printers, facsimile machines, modems, etc.
- C. "Outlets" shall refer to the group of receptacles or jacks at the location where the stations connect.
- D. "Jacks" or "Ports" shall refer to the individual receptacles where phones, computers, etc. connect.
- E. "Station Cables" shall refer to the horizontal cables connecting patch panels or terminal blocks in the Telecommunications Closets to the stations.

- F. "Pathways" shall refer to conduits, sleeves, cable trays, distribution rings, etc., which are employed to route backbone and stations cables between equipment rooms, telecommunications closets, stations, outlets, etc.
- G. "Backbone Cables", "Riser Cables" or "Tie Cables" shall refer to copper cables 25-pair or more and optical fiber cables 6-strand or more, connecting main cross-connect facilities, intermediate cross-connect facilities and telecommunications closets. These cables may include outside plant cables between buildings and riser cables between floors.
- H. "Equipment Rooms" (ER) or "Communication Equipment Rooms" (CER) shall refer to a special-purpose room that provides space and maintains a suitable operating environment for large communications and/or computer equipment. These rooms may contain main cross-connect or intermediate cross-connect facilities, MUXs, PBXs and building entrance facilities from the local exchange carrier (LEC).
- I. "Telecommunications Closets (TC)" shall refer to a floor-serving facility for housing telecommunications equipment, cable terminations and cross-connect wiring. This shall be the point at which station cables terminate.
- J. "Terminal Blocks" shall refer to multiple punch down cable terminations.
- K. "Patch Panels" shall refer to rack or frame mounted multiple punch down cable terminations with RJ-45 style, 8-position jacks on the face for "plug and play" cross connect capability.
- L. "Cable Management" shall refer to rings, troughs, gutters etc., mounted in conjunction with telecommunications distribution equipment and terminal blocks, for the orderly routing of cables, patch cords, etc.

1.11 STORAGE AND HANDLING

A. The contractor is responsible for safekeeping of all equipment and materials, on the job site. The owner assumes no responsibility for protection of above-named property against fire, theft, and environmental conditions.

1.12 PROTECTION OF OWNER'S FACILITIES

- A. Effectively protect the owner's facilities, equipment, and materials from dust, dirt, and damage during construction.
- B. Remove protection at completion of the work.
- 1.13 CLOSEOUT SUBMITTALS
 - A. Division 1 Contract Close-out Procedures.
 - B. Project record drawings: Submit project record drawings in both paper and electronic (electronic format shall be AutoCAD, Ms Word, and Excel) format at conclusion of the project which shall include:

- 1. Complete field accurate set of approved shop drawings as specified under the Submittal requirements of this Section.
- 2. Warranty documents for all equipment.
- 3. Copper certification test result printouts both in paper and electronic format.

PART 2 – Products

2.01 MANUFACTURERS

- A. Provide products of manufacturers as named in individual articles
- B. Submittals to be approved before installation.
- C. Where no manufacturer is specified, provide products of manufacturers in compliance with requirements.
- D. Any item of equipment or material not specifically addressed on the drawings or in this document and required to provide a complete installation shall be provided in a level of quality consistent with other specified items.
- E. Provide products that are suitable for intended use, including, but not limited to environmental, regulatory, and electrical
- 2.02 STRUCTURED CAT 6 CABLING SYSTEMS WILL INCLUDE COPPER AND FIBER CABLE AND CONNECTING HARDWARE. INCLUDING BUT NOT LIMITED TO JACKS/CONNECTORS, FACEPLATES, PATCH CABLES. PROVIDED EQUIPMENT FROM THE FOLLOWING LIST OF APPROVED MANUFACTURERS. PROVIDED ONLY EQUIPMENT FROM ONE OF THE FOLLOWING APPROVED SYSTEMS, UNLESS PRODUCT SUBSTITUTION APPROVAL HAS BEEN SECURED IN WRITING:
 - A. Krone/Siecor
 - 1. Cable Krone
 - 2. Patch Panel Category 6
 - 3. Patch cables Krone Cat 6
 - B. Berk-tek / Ortronics
 - 1. Cable -- Berk-tek
 - 2. Patch Panel Category 6
 - 3. Connector Category 6
 - 4. Patch cables Category 6
 - C. Connectors & Face plates

- 1. All jacks shall be pinned to 568-B wiring standard
- 2. Work station connectors (jacks) shall have a 45 degree exit downward.
- D. Open equipment rack
 - 1. Open frame, 19 in. equipment rack, 7 foot overall height with flange base
 - 2. Mounting rails drilled front and back and tapped to EIA standards
 - 3. 40+ Rack Mount Spaces (RMS). (RMS = 1.75")

2.03 WALL MOUNTED TERMINATION RACKS

- A. Where specified, provide full height 19-inch-wide NEMA standard wall mounted rack frame with footprint not to exceed 24" width; with 14" deep side distribution cable troughs with included releasable Velcro straps for distribution cables; front mounted cable management rings for vertical cable management on face of rack; included top mount cable trough.
- B. Provide an electrically isolated chassis ground bus bar on the top rear side of the rack as the isolated chassis ground system (CGS) busbar. Bond to the chassis with #6 braided bonding jumpers and to closet ground bus with #6 AWG copper.
- C. Wire Management
 - 1. When not provided as an integral component of the patch panel system, provide and install wire management modules compatible with racks and patch panels to be installed. Modules shall be capable of providing vertical and horizontal management and provide high-density cable management.

PART 3 - EXECUTION

- 3.01 GENERAL
 - A. PRE-INSTALLATION SITE SURVEY
 - 1. Prior to start of systems installation, meet at the project site with the owner's representative and representatives of trades performing related work to coordinate efforts. Review areas of potential interference and resolve conflicts before proceeding with the work. Facilitation with the General Contractor will be necessary to plan the crucial scheduled completions of the equipment room and telecommunications closets
 - 2. Examine areas and conditions under which the system is to be installed. Do not proceed with the work until satisfactory conditions have been achieved

- B. All wiring shall be run in pathway or raceway and shall be neatly tied or laced in cabinets and terminated on terminal strips provided for the purpose. Each cable shall be identified by an approved marking system at each end.
- C. Wherever materials, methods or placements of materials and equipment for the communications work is provided by other Subcontractors or the Owner, it shall be the responsibility of this specialty Subcontractor to coordinate that work and assure that it is provided in such a manner as to enhance the final system operation.
- D. Test the systems, demonstrate operation to the Contracting Agency and provide training as specified.
- E. Work under this section shall be closely coordinated with work under other sections of the project.
- F. Tie wraps shall not deform the cable insulation when tightened.

3.02 DELIVERY AND STORAGE

- A. Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as part of the contract. Include delivery, unloading, setting in place, fastening to walls, floors, ceilings, or other structures where required, interconnecting wiring of system components, equipment alignment and adjustment, and other related work whether or not expressly defined herein.
- B. Materials shall be inspected and inventoried promptly upon receipt.
- C. All inspection and testing shall be performed under the observation of the Contracting Agency at the Contracting Agency's option. Provide three (3) working days advance notice of tests.

3.03 WORKMANSHIP

- A. Follow cable manufacturer's specification regarding handling methods, retaining/support methods, bending radius and maximum pulling tension limitations.
- B. Telecommunication cables shall not be installed in the same raceway as power cables.
- C. Components of the system shall be installed in a neat, workmanlike manner. Wiring color codes shall be strictly observed, and terminations shall be uniform throughout the system. Identification markings and systems shall be uniform. TIA/EIA 568 wiring codes shall standardize all wiring.
- D. Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as part of the contract. Include delivery, unloading, setting in place, fastening to walls, floors, ceilings, or other structures where required, interconnecting wiring of system components, equipment alignment and adjustment, and other related work whether or not expressly defined herein.

E. Install materials and equipment in accordance with applicable standards, codes, requirements, and recommendations of national, state, and local authorities having jurisdiction, and National Electrical Code® (NEC) and with manufacturer's printed instructions.

3.04 SUPPORT AND ROUTING OF CABLES

- A. Station cables and tie cables installed within ceiling spaces shall be routed through these spaces at right angles to electrical power circuits and supported only from the structure.
- B. Use of ceiling tiles, grid or hanger wires for support of cables shall be prohibited
- C. Cabling above accessible ceilings may be installed in cable tray system or supported by "J" hook style cable hanger pathways. Open cabling shall be neatly routed and securely supported. Open cabling shall not rest on ceiling system, duct work, piping or other systems. Cabling that is not properly installed shall be removed and replaced at the Contractor's expense.
- D. Concealed cabling, such as in walls, above hard ceilings, and through soffits shall be installed in conduit.
- E. Where cabling is not installed in conduit or cable tray system, support cable every four-(4) feet with J- hooks attached to permanent structures. Cable shall not to be attached to or lay on other cables, pipes or conduit.
- F. Maintain a minimum clearance of:
 - 1. 5 inches from unshielded power lines or electrical equipment (lights, motors, etc) for circuits of less than 2kVA
 - 2. 12 inches for 2 5 kVA circuits
 - 3. 24 inches for circuits greater than 5Kva.
 - 4. 48 inches from power transformers.

3.05 HORIZONTAL CABLING

- A. Install cables in one continuous piece. Splices will not be allowed.
- B. Do not exceed 90 meters cable length for any connection.
- C. Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall pressure when installing cables.
- D. Where manufacturer does not provide bending radii information, minimum bending radius shall be 10 times cable diameter.
- E. Installation shall conform to the following basic guidelines:
 - 1. Use of approved wire, cable, and wiring devices

- 2. Neat and uncluttered wire termination
- 3. When terminating cable, only remove as much cable jacket as needed to terminate properly to the connecting hardware
- 4. Cable pairs shall not be untwisted more the .25 inch at the point of termination to work station connector.
- 5. Install 1-foot cable service loop for all horizontal cable at or near the workstation outlet.

3.06 RACEWAY INSTALLATION

- A. Provide raceway of required size and type. Provide accessories required for a complete installation.
- B. Route raceway to avoid interference, using standard sections and a minimum number of field-cut sections.
- C. Route raceway to avoid interference with removal and installation of lighting fixtures and devices of other systems that require servicing or operation.
- D. Remove any sharp burrs or edges from raceway. Provide radius corner inserts for surface raceway systems.
- E. Completed raceway runs shall have no cracks or openings at coupled sections.
- F. Strict adherence to the National Electrical Code is required for any raceway penetrations of fire-rated walls or penetrations.

3.07 INTERCONNECTIONS

A. Interconnections at all terminal hardware shall be provided to form a complete and functioning system.

3.08 DAMAGE AND DEFECTS

- A. Cable shall be carefully inspected for sheath defects or other irregularities as it is paid out from the reel. When defects are detected, pulling shall stop immediately and the cable section shall be repaired or replaced at the discretion of the Contracting Agency. A system of communications shall be maintained between pulling and feed locations so that pulling can be stopped instantly, when required.
- B. Adequate care shall be exercised when handling and storing reels of cable to prevent damage to the cable. Cable with dents, flat spots, or other sheath distortions shall not be installed.
- 3.09 LAYOUT

- A. All work shall be laid out in advance. Cables shall be racked and supported in a workmanlike fashion. All work shall be labeled according to ANSI/TIA/EIA 606, and color-coded according to BICSI Standards.
- B. Cables shall be terminated sequentially from left to right, top to bottom starting with the lowest assigned number at the upper left-hand corner of the panel.
- C. Keep up to date "As-built" record drawings at each job site detailing the layout of all data racks and telephone, data and trunk terminal blocks on terminal boards, including a typed listing of cables/rooms served by each terminal block.
- D. Layout Shop Drawings shall be prepared using CAD. Final approved Shop Drawings shall be updated with precise "as-built" conditions and shall be submitted with the Operations and Maintenance Manuals. File format shall be AutoCAD "DWG" or "DXF".

3.10 TELECOMMUNICATION CLOSETS

- A. Install 10-foot cable service loop for all horizontal cable at TC.
- B. Install adequate support structures for 10-foot cable service loops at each TC.
- C. Provide in each telecommunication closet a single line diagram framed under a plexiglass cover. Diagram shall include all distribution and horizontal cabling served by the respective closet as well as identification and floor plan indicating locations of termination.

3.11 TERMINATIONS

- A. Cables shall be marked with wire markers at both ends, and terminals on terminal blocks shall bear the cable number.
- B. Wire twist shall be maintained to within 0.25" of the terminal block fingers.

3.12 LABELING

- A. Labeling shall conform to ANSI/TIA/EIA-606 standards. In addition, provide the following:
 - 1. Label each outlet with permanent self-adhesive label with minimum 3/16-in. high characters
 - 2. Use labels on face of data patch panels. Provide facility assignment records in a protective cover at each telecommunications closet location that is specific to the facilities terminated therein
 - 3. Labels shall be machine-printed under the provisions of Section 16075. Handlettered labels shall not be acceptable
 - 4. Label outlets with room number in which outlet is located (xxxx), followed by a single number to indicate particular outlet within room (x), followed by a single number to indicate particular connector in the outlet, for example:

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5. Label patch panels with room number in which outlet is located (xxxx), followed by a single number to indicate particular outlet within room (x), followed by a singe number to indicate particular connector in the outlet, for example:

3.13 GROUNDING

- A. Grounding shall conform to ANSI/TIA/EIA 607 Commercial Building Grounding and Bonding Requirements for Telecommunications, National Electrical Code® and manufacturer's grounding requirements as minimum.
- B. Ground all equipment racks, housings, and raceways.
- C. Connect cabinets, racks, and frames to as recommended in ANSI/TIA/EIA 607 and as indicated on the drawings.

3.14 COMPLETION AND TESTING

- A. Mark up floor plans showing outlet locations, type, and cable marking of cables. Turn these drawings over to the owner two (2) weeks prior to move in to allow the owner's personnel to connect and test owner-provided equipment in a timely fashion.
- B. Telecommunications System test reports shall be submitted to and approved by the Contracting Agency. The test reports shall certify that the Telecommunications Distribution System is complete, passes all test criteria, is fully operational, and that all work has been witnessed as specified.
- C. After installation and test of each system is complete, each system and the entire system shall be demonstrated and tested for proper operation. The Contractor shall schedule a demonstration with the following representatives present:
 - 1. Contractor's representative.
 - 2. Contracting Agency's representative.
- D. The Contractor shall provide all forms, instrumentation and test equipment, loads, and other consumables required to demonstrate the systems to the Contracting Agency's satisfaction.
- E. Incoming Inspection Tests
 - 1. Inspect all materials for damage.

- F. Final Inspection Tests
 - 1. Testing of all copper wiring shall be performed prior to system acceptance.
 - Testing shall conform to TIA/EIA TSB-67 Transmission Performance Specifications for Field-Testing of Unshielded Twisted Cabling Systems and ANSI/TIA/EIA-568-A-1, Propagation Delay and Delay Skew Specification for 100 ohm 4-pair cable. Testing shall be accomplished using level IIe field testers.
 - 3. Where any portion of system does not meet the specifications, correct deviation and repeat applicable testing at no additional cost to the owner. Replace all rejected materials
 - 4. Re-test all cable disturbed after testing, at the direction of Contracting Agency.
 - 5. Spare un-terminated cable shall be temporarily terminated for testing.
- G. Test AC grounds and voltages in equipment racks.

3.15 OPERATING AND MAINTENANCE MANUALS

- A. Prepare manuals describing the servicing and maintenance requirements for the equipment being provided as required in this Section of these specifications.
- B. Information contained in the manuals shall consist of catalog data on each item, together with parts lists, wiring diagrams, test reports, description of routine maintenance required, suggested frequency of maintenance and recommended practices, and shall be 8-1/2 inches by 11 inches in size. Catalog pages and data in manuals shall be neat, clean copies. Drawings shall be accordion folded to above size. An index shall be provided which shall list all contents in an orderly manner. Include corrected shop drawings in the maintenance manuals. Each copy of the instruction manual shall be adequately labeled for identification and shall include plastic tabs coordinated with the index.
- C. Refer to "Submittals" requirements of this Section for additional O&M requirements.
- D. Submit project record drawings in both paper and electronic (electronic format shall be AutoCAD, MS Word, and Excel) format at conclusion of the project and include:
 - 1. Approved shop drawings,
 - 2. Plan drawings indicating locations and identification of work area outlets, nodes, telecommunications closets (IDFs), and backbone (riser) cable runs.
 - 3. Telecommunications closets (TCs) and equipment room (ER and/or MDF) termination detail sheets.
 - 4. Labeling and administration documentation
 - 5. Warranty documents for equipment
 - 6. Copper certification test result printouts and diskettes

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END OF SECTION

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SECTION 27 13 43.43 CABLE SERVICES CABLING

PART 1 – GENERAL

- 1.01 SUMMARY
 - A. Section includes the installation of a complete television distribution system and the television distribution equipment. The system shall include, but not be limited to, splitters, directional tapoffs, wall taps, conduit, cable, fittings, and accessories required to provide a complete operating system.
- 1.02 SYSTEM DESCRIPTION
 - A. Installation of premises wiring for video signal distribution.
- 1.03 PERFORMANCE REQUIREMENTS
 - A. Signal strength at each outlet and each channel shall be a minimum of 6dBmV (2000 microvolts across 75 ohms) and a maximum of 15dBmV (5600 microvolts across 75 ohms).
- 1.04 CODES AND STANDARDS
 - A. All wiring shall be in accordance with the requirements of Article 725 (Class II signaling systems) and Article 820 (community antenna television systems) of the National Electrical Code, applicable local codes and manufacturer's wiring diagram.
 - B. The system shall comply with FCC requirements regarding radiated RF signal.
- 1.05 SUBMITTALS
 - A. Division 1 Shop Drawings, Product Data and Samples
 - B. Product Data: Submit catalog data showing electrical characteristics and connection requirements for each component.
 - C. Submittals shall include signal levels anticipated at existing head-end equipment and at each outlet
 - D. Manufacturer's Field Reports: Indicate activities on site, adverse findings, and recommendations.
- 1.06 CLOSEOUT SUBMITTALS
 - A. Division 1 Contract Close-out Procedures.
 - B. Project Record Documents: Record actual locations of outlets, devices, and cable routing. Provide complete set(s) of field accurate as-built Drawings
 - C. Test Reports: Indicate procedures and results for specified field testing and inspection.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Supplier: Authorized distributor of specified manufacturer with minimum three years' experience.

PART 2 PRODUCTS

- 2.01 ACCEPTABLE MANUFACTURERS
 - A. These specifications are based on specific equipment provided by the manufacture listed in each equipment section. This information is provided as a minimum standard of design and quality for the equipment to be provided.
 - B. The intent is to establish a standard of quality, function and features. It is the responsibility of the bidder to ensure that the proposed product meets or exceeds every standard set forth in these specifications.
 - C. The functions and features specified are vital to the operation of this facility, therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

2.02 SYSTEM REQUIREMENTS

- A. The system shall be completely designed and installed to provide distribution of the following inputs to the outlets as indicated on the drawings:
 - 1. Local Satellite Dish Receiver.
- B. The distribution system shall furnish signal to all TV outlets shown on the drawings.
- C. The distribution system shall provide for ready attachment of monitor/TV receivers at any outlet and at any time without additional auxiliary equipment.
- D. The system shall be capable of future modification to receive CATV channels or additional UHF or VHF channels without replacement of cable or major components.

2.03 CABLES

- A. Coaxial cable used in the system shall be guaranteed for transmission and structural return loss and be so certified.
- B. Coaxial cables shall be run in continuous lengths and no splices shall be permitted in any run.
- C. All cables terminating at amplifiers or splitters shall be tagged as to function and destination.

D. Cables shall be Type RG 6/U cable for feeder runs. All cabling shall be Plenum rated.

2.04 SPLITTERS

- A. Product Description: Inline, all channel, back-matched splitter, quantity of ports as required.
- B. Through Loss: 3.5 dB for two-way; 6.7 dB for four-way.
- C. Isolation: 16 dB, minimum.
- D. Line splitters shall have a flat frequency response over the entire operating band from 5 MHz to 1000 MHz.
- E. All unused ports of splatters shall be terminated with a 75-ohm termination.
- F. Splitters shall be Blonder-Tongue XRS Series.

2.05 DIRECTIONAL TAPOFFS

- A. Tapoffs shall have a flat frequency response over the entire operating band from 5 MHz to 1000 MHz.
- B. Tapoffs shall be available in the with the following tap values 4, 6, 9, 12, 16, 20, 24, 27 and 30 dB.
- C. Tapoffs shall be Blonder Tongue CRT Series.

2.06 OUTLETS

- A. Wall type outlets shall be provided at each location shown on the plans.
- B. Each outlet shall be configured as shown on the plans. Outlet output impedance shall be 75 ohms.
- C. Outlet frequency band shall be SUB/VBF/CATV/UHF.
- D. The outlets shall accept RG-6 type cables.

PART 3 EXECUTION

- 3.01 INSTALLATION
 - All open wiring shall be plenum rated. Plenum rated cables may be run exposed in cable tray or above accessible ceiling supported by suitable cable rings or fasteners.
 Concealed cabling, such as in walls, above hard ceilings, and through soffits shall be installed in conduit.

- B. Provide home run cable from each television outlet back to splitter(s) on utility backboard.
- 3.02 FIELD QUALITY CONTROL
 - A. Division 1 Contract Closeout.
 - B. Measure and record signal level at each outlet.
- 3.03 MANUFACTURER'S FIELD SERVICES
 - A. Division 1 Quality Control: Manufacturer's field services.
 - B. Supervise final adjustments and tuning of system.
- 3.04 ADJUSTING
 - A. Division Contract Closeout: Testing, adjusting, and balancing.

END OF SECTION

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SECTION 31 01 00 CONSTRUCTION SURVEY

PART 1 GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide all surveying and staking essential for completion of the project in conformance with the plans and specifications and shall perform the necessary calculations required to accomplish the work. Staking, surveying, computations, and calculations shall be accomplished in accordance with standard engineering and surveying practice.

1.02 PERSONNEL AND EQUIPMENT

- A. Surveyor:
 - 1. All survey work performed in relation to measurement of quantities for payment under the Contract shall be performed under the direction of a Professional Land Surveyor licensed by the State of Alaska to practice land surveying. The Contractor shall be responsible for the supervision of the construction surveying personnel and any errors from the operation of said personnel shall be corrected at the expense of the Contractor, and at no additional cost to the Owner.
- B. Equipment and Method:
 - 1. The Surveyor shall use suitable equipment for the layout work required and shall furnish all stakes, templates, straight edges, and other devices necessary for checking and maintaining points, lines, and grades.
 - 2. Field measurements and staking for items related to measurement of quantities for payment under the Contract shall be made using electronic data collection. The contractor's Surveyor shall verify depth of excavation and top of embankment based on field survey points using TIN format with fault lines as 3D polylines. All surveys of material quantities shall be provided to the Engineer. The coordinate files, in ASCII format, a printout of the TIN, and an AutoCAD drawing of the contours generated by the TIN shall be furnished to the Engineer. The AutoCAD drawing shall be stamped and signed by the Professional Land Surveyor.
 - 3. The Contractor's surveyor shall make a conscious attempt to locate all property corners and monuments along the route of work, and shall reference those corners that may be disturbed due to this work. At the completion of the project, the Contractor shall restore all disturbed property corners and monuments at no additional cost to the Owner.
 - 4. The Contractor's surveyor shall maintain accurate and up-to-date as-built measurements of the ongoing construction. Upon completion of the project, the Contractor shall provide the Owner with one set of redline record drawings stamped and signed by a Professional Land Surveyor and survey notes.

1.03 QUANTITY MEAUREMENT

- A. Original Ground:
 - 1. A topographic survey was completed in June 2003 by McLane Consulting Group. The results of this survey will define the pre-excavation surface to be used in the determination of the unit price quantities for excavation.
- B. After Excavation:
 - 1. When excavation to the approved subgrade elevations has been accomplished on all areas of the site, the Contractor provide a cross section survey by a professional Land Surveyor at Contractor's expense. Contractor shall provide the Engineer written notification at least 48 hours in advance of when the survey is to be performed. The survey shall be done on a nominal 25' grid and at edges, boundaries and break-lines in the excavation. The results of this survey will establish the after excavation cross sections used in the determination of the unit price excavation quantities. The registered Land Surveyor shall provide quantity calculations with certification of accuracy and drawings in electronic format acceptable to Engineer.
- C. Finish Grade:
 - 1. Contractor's Surveyor shall provide staking for finish grades. Calculation of fill quantities will be based upon comparison of approved subgrade excavation surface and as-built finish grade surface.
- PART 2 PRODUCTS (not used)
- PART 3 EXECUTION (not used)

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

- 1.01 DESCRIPTION OF WORK
 - A. Work included:

Site clearing includes, but is not limited to:

- 1. Removal of all vegetation, debris, brush, trees, logs, tree stumps, roots, and root mat to a Contractor-provided disposal site. Limits of Site Clearing shall be as shown on Drawings, staked by Contractor, and approved by the Engineer.
- 2. Topsoil stripping.
- 3. Preservation from damage of all items designated to remain.
- B. Related Work Specified Elsewhere
 - 1. Section 312000: Earth Moving

PART 2 PRODUCTS (not used)

PART 3 EXECUTION

3.01 SITE CLEARING & GRUBBING

A. General:

Contractor shall remove all vegetation, debris, brush, trees, logs, tree stumps, roots, and root mat to a Contractor-provided disposal site, and the preserve from damage of all items designated to remain for the new construction. Prior to site clearing, the Contractor shall stake the clearing limits for review by the Engineer.

B. Topsoil:

Contractor shall provide friable loam topsoil as required. If suitable soil exists on site, Contractor may stockpile and topsoil for later incorporation into the project as directed by the Engineer.

3.02 DISPOSAL OF WASTE MATERIALS

A. Removal from Site:

Remove waste materials and unsuitable and excess topsoil from Owner's property and of offsite. The Contractor shall be responsible for furnishing a disposal site.

B. Offsite Disposal:

Before dumping materials or debris on private or public lands, obtain from the owner of such land written permission for such dumping and a waiver of all claims against the property owner where items originated for any damage to such land which may result, together with all permits

required by law for such dumping. Furnish a copy of such permission, waiver of claims, and permits to the Engineer before commencing work.

C. Burning on Owner's Property:

Onsite burning will not be permitted.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

- 1.01 DESCRIPTION
 - A. This section covers the furnishing of materials, labor, equipment and supervision required to complete the site earthwork construction including roads, walks, parking areas and building pad; excavation, fill and backfill and site grading and drainage as shown on the contract drawings.

1.02 TESTING

A. Where compaction requirements are specified, the maximum soil density shall be determined in accordance with the current requirements of AASHTO Standard Method T-180-D.

The Diameter of the test mold in AASHTO T-180 Method D limits the size of particles which may be included in the test to that passing the three-quarter inch (3/4") sieve. In those instances where the particles are retained on the three-quarter inch (3/4") sieve, a correction must be applied to the standard laboratory density prior to calculating the percent compaction. To expedite field result the plus three-quarter inch (3/4") material may be sieved wet and the weight computed as a percent of the total weight of the material from the hole. The corrected laboratory density shall be computed in each instance by the formula:

Corrected Lab Density=
$$\frac{62.4}{\frac{A}{C} + \frac{62.4(B)}{rD}}$$

A = Percent by weight of original material retained on the 3/4-inch sieve, expressed as a decimal.

- B = Percent by weight of original material passing the 3/4-inch sieve, expressed as a decimal.
- C = Specific gravity of +3/4-inch material (apparent specific gravity) as determined by AASHTO T-85.
- D = Uncorrected laboratory density (minimum 3/4-inch material).
- R = Coefficient with value depending A, as follows:
- For A = 0.18 or less, r = 1.00
 - A = 0.19 or more, r = 1.036 0.2A
- B. The in-place soil density shall be determined in accordance with:
 - ASTM D1556 Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
 - ASTM D2167 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; and/or

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- ASTM D6983 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Method (Shallow Depth)
- C. In-place density tests shall be taken on each lift of fill or backfill placed during site grading at the rate of one test per 5,000 square feet of area. In-place density tests on each lift of trench backfill shall be taken at the rate of one test per 100 lineal feet, or one test per lift if the trench is less than 100 feet long. Failing test areas shall be re-compacted and retested until the compaction requirements are met.
- D. Backfill under traffic and building structures and trench backfill from six inches (6") over the top of the pipe to the surface shall be compacted to ninety-five percent (95%) of maximum density, unless otherwise noted and approved by the Owner's Representative. The Owner's Representative may permit lifts in excess of twelve inch (12") thickness when classified fill or backfill is placed over swampy or saturated ground, or where he is satisfied that the Contractor's method and equipment will consistently produce the specified density.
- E. The backfill material shall be placed in horizontal loose lifts not exceeding twelve inches (12") in thickness and compacted. Any excavations improperly filled shall be reopened to the depth required for proper compaction, then refilled and compacted at the Contractor's expense. The use of water in excess of the quantity required to obtain specified density (optimum moisture content) to settle or compact the backfill will not be permitted.

1.03 SUBMITTALS

- A. Contractor shall submit a gradation test, in accordance with ASTM D-422, on each type and source of material used in fills and backfills. If material is to be non-frost susceptible, hydrometer tests shall be performed in accordance with ASTM D-7928 unless the material has less than 4% passing the 200 sieve. The results of a new gradation and hydrometer test shall be submitted by the Contractor for each furnished material and each time the furnished material changes from that which was previously approved.
- B. Contractor shall submit a processing and blending plan to the Owner's Representative for review and approval prior to utilization of classified fill or backfill from more than one source. The plan must be accompanied by materials analysis reports for each material source and fully describe how the material will be placed and blended to ensure that timely and accurate in-place density testing can be achieved.

1.04 DEFINITIONS

- A. Classified Material
 - 1. Classified fill and backfill shall contain no lumps, frozen material, organic matter, or other deleterious material, and shall be durable and sound. It shall have a plasticity index not greater than six (6) as determined by ASTM D-4318 and shall conform to one of the following types as required by the Drawings and Specifications. The coarse aggregate material conforming to the requirements specified below shall have a percentage of wear not to exceed thirty (30) after five hundred (500) revolutions, as determined by the current requirements of ASTM C-131. The portion of the material

retained on a #4 sieve shall be known as coarse aggregate. Both coarse and fine aggregates shall conform to the quality requirements of AASHTO M-147.

2. Materials furnished by the Contractor for use as Type II Classified Fill and/or Backfill shall be graded within the limitations delineated below:

Type II

31		
U.S. Std. Sieve Size	Cumulative % Passing By Weight	
8"	100	
3"	70-100	
1 1/2"	55-100	
3/4"	45-85	
#4	20-60	
#10	12-50	
#40	4-30	
#200	2-6	

In addition to the grading limits listed above, the fraction of material passing the #200 sieve shall not be greater than twenty percent (15%) of that fraction passing the #4 sieve.

3. Materials furnished by the Contractor for use as Type IIA Classified Fill and/or Backfill shall be graded within the limitations delineated below:

<u>l</u>	J. S. Std. Sieve Size	Cumulative % Passing By Weight
	2"	100
3	3/4"	50-100
#	# 4	25-60
#	#10	15-50
#	# 40	4-30
#	<i>‡</i> 200	2-6

In addition to the grading limits listed above, the fraction of material passing the #200 sieve shall not be greater than twenty percent (20%) of that fraction passing the #4 sieve.

Type IIA Classified Fill

- 4. Materials furnished by the Contractor for use as Type III Classified Fill and/or Backfill shall be approved sand or gravel with a maximum of ten percent (6%) passing the #200 sieve.
- 5. Materials furnished by the Contractor for use as Leveling Course shall be graded within the limitations delineated below:

U.S.Std.Sieve Size	e Cumulative % Passing By Weight
1"	100
3/4"	70-100
3/8"	50-80
#4	35-65
#8	20-50
#50	8-28
#200	*2-6

Leveling Course

*In addition to the grading limits stipulated above, fractions passing the #200 sieve shall not be greater than seventy-five percent (75%) of the fractions passing the #50 sieve.

Course Aggregate: The coarse aggregate material conforming to the requirements specified above shall have a percentage of wear not to exceed thirty-five (35) after five hundred (500) revolutions, as determined by the current requirements of ASTM C-131. It shall consist of angular fragments reasonably uniform in density and quality, and reasonably free from thin and elongated pieces, dirt, and other objectionable material. At least fifty percent (50%) of the coarse aggregate particles shall have two or more mechanically fractured faces.

Fine Aggregate: The fine aggregate shall consist of material free of organic or other objectionable matter. The fine aggregate, either naturally combined with the coarse aggregate or separately obtained and mixed therewith, shall be of such character that the composite material will conform to the gradation and other requirements specified.

- B. Additional Excavation: Excavation beyond the limits necessary to place classified or unclassified material, where authorized in writing in advance by the Owners Representative.
- C. Area Grading: Area grading consists of the excavation and fill work, along the perimeter of the site, necessary for a smooth transition from the design site grades to the grade(s) of the adjacent properties. This work is also commonly called "site grading" or "overlot grading".
- D. Backfill: Material placed in an excavated area.
- E. Bedding: Ground or support in which pipe is laid. Type III Classified Fill, with the additional requirement that no particles may be greater than 3" size that is used for backfill in a utility trench at the direction of the Owner's Representative.

- F. Borrow: Material used as fill and/or backfill which is obtained from a source other than required excavation.
- G. Disposal Site: Any area where waste, unsuitable, unusable or surplus material from construction is placed. Contractor must provide offsite disposal site throughout duration of project.
- H. Excavation: Area or material removed to provide a suitable base for improvement.
- I. Fill: the material placed above the original or natural ground line.
- J. Leveling Course: compacted material placed above the subbase and below the finishing surface of the improvement.
- K. Non-Frost-Susceptible (NFS) Material: Non-organic soil containing less than three percent (3%) by weight of grains smaller than .02 mm obtained from minus three inches (-3") material.
- L. Over-Excavation: Any excavation beyond limits of the contract that has been done without the written authorization of the Owner's representative.
- M. Service Connection: Any connection from a main line utility or storm drain to a property line for the purpose of providing service to an individual property.
- N. Subbase: The subbase is compacted material placed above the subgrade and below the leveling course.
- O. Subgrade or Bottom of Excavation: The subgrade is material below the bottom of excavation and upon which the subbase material is placed.
- P. Suitable Soils: Excavated soils that conform to the requirements for the intended use as determined by the Owner's Representative.
- Q. Trench: Any Excavation for a utility or drainage system.
- R. Unclassified Material: Inorganic soils, free of trash, peat, volcanic ash, debris, or frozen clods.
- S. Unsuitable soils: All soils and debris that do not conform to the requirements for Type III classified fill, or which do not meet the requirements for the intended use, as determined by the Owner's Representative.
- T. Usable excavation: Inorganic non-frost susceptible sand or gravel soils, free of trash, peat, volcanic ash, debris, or frozen clods, that are excavated from the project site and are approved by the Owner's Representative for incorporation into the backfill.
- U. Unusable Excavation: All suitable excavated soils that are surplus to the needs of the project and all unsuitable soils as designated by the Owner's Representative.

1.05 WEATHER LIMITATIONS

A. Unless otherwise authorized by the Owner's Representative, fill, backfill, and leveling course shall not be placed when the atmospheric temperature is below 35 degrees Fahrenheit. When the temperature falls below 35 degrees Fahrenheit, it shall be the responsibility of the Contractor to protect all areas of completed work against any detrimental effects. Any areas of

work not completed in accordance to the plans and specifications that are damaged by weather shall be reconditioned, reshaped, and recompacted by the Contractor in conformance with the requirements of these specifications without additional cost to the owner.

1.06 EXISTING UTILITIES

- A. At various stages of the project the Contractor will be required to work in close proximity to existing utilities, including possible removal of material over, under, and adjacent to the lines. It is the Contractor's responsibility to contact the utility owners for locations, scheduling, and additional information.
- B. The Contractor shall protect these lines in a manner approved by both the Owner's Representative and the Utility Owner in writing.
- C. Compaction density and techniques in the vicinity of existing utilities shall conform to requirements for classified fill.
- D. The Contractor is directed to contact the utility companies both prior to bidding and during construction, for information about existing utilities, scheduling, location and other pertinent information.
- E. Utilities are required to be relocated during construction. The Contractor is directed to contact the utility companies both prior to bidding and during construction and include any additional costs in relocating utilities in bid amount.

1.07 CONTAMINATED MATERIAL

A. Unless otherwise noted in the Contract Documents, the Owner is not aware of any contaminated material within the project limits. If such material is encountered, Contractor shall notify the Owner's Representative immediately for direction. Unless the contamination was caused by Contractor's operation, discovery of contaminated material will be treated as a changed condition.

1.08 EQUIPMENT

All equipment, tools, and machines used in the performance of the Work covered by these Specifications shall be subject to the approval of the Owner's Representative and shall comply with all applicable safety requirements. All equipment used on the project shall be adequately maintained and shall be the proper equipment for the Work being accomplished so as to produce the result required by the Contract Documents.

1.09 RELATED WORK

A.	Construction Survey	Section 310100
В.	Geotextiles	Section 312010
C.	Asphalt Paving	Section 321216

PART 2-PRODUCTS

2.01 MATERIAL SOURCE

- A. When the quantity of classified, unclassified, and screened soils required for the work exceeds that available from excavated materials, the additional material shall be from Contractor-furnished borrow areas. The Contractor shall locate, obtain, develop and process classified and unclassified materials to complete the requirements of work.
- B. The source of materials shall be approved by the Owner's Representative. Any change in the source of materials during the construction shall be approved by the Owner's Representative.

2.02 MATERIAL HANDLING

- A. When the soils into which the excavation will penetrate and/or when the backfill soils are sensitive to erosion, sloughing under seepage forces, softening during soaking, and/or repeated loading of heavy equipment, the Contractor shall take all necessary steps to protect the work. These may include, but are not limited to:
 - 1. Sloping the excavation to drain and/or dewatering from inside the excavation with sumps and/or pumps or from outside the excavation with well-points or other means;
 - 2. Limiting construction traffic to designated and maintained construction roads and placing additional temporary fill as necessary to support the traffic loads.
 - 3. Developing alternate access routes.
 - 4. Excavating with a smooth bladed backhoe from outside the excavation.
 - 5. Covering of temporarily stockpiled unclassified fill to protect it from precipitation as directed.
 - 6. Using only dry unclassified fills for compaction and reuse.
 - 7. The costs to protect the work shall be included in the bid price for earthwork.
- B. If the subgrade or backfill soils are disturbed by surface runoff, ponding, seepage, and/or construction traffic, the disturbed soils shall be regraded and densified to the density requirements specified herein or completely removed and replaced with classified materials compacted to the density requirements specified herein. The corrective work shall be performed by the Contractor at no additional expense to the owner.

PART 3 – EXECUTION

3.01 CONSTRUCTION STAKING

A. General

The Contractor shall furnish all vertical and horizontal controls and staking sufficient for Contractor's needs to accurately complete the requirements of this project.

B. Contractor shall furnish Professional Land Surveyor for Measurement of excavation and fill quantities as specified in Section 310100 Construction Surveying.

3.02 SITE EXCAVATION

- A. General
 - 1. Excavation consists of the removal and reuse or disposal of all materials encountered to obtain the required subgrade elevations in accordance with the typical sections shown on the Drawings, and as directed by the Owner's Representative.
 - 2. Excavated material conforming to the specifications for classified fill and backfill shall be used where practical for fill and backfill as directed by the Owner's Representative. When this material is used, it shall be considered usable excavation. When not used on the Project site, the material shall be hauled away and treated as unusable excavation. Unusable excavation shall be hauled to a Contractor-furnished disposal site. Unless otherwise specified in the Special Provisions, the Contractor will not be required to transport usable excavation from one schedule of a Contract for use in another schedule of the same Contract unless they are continuous or adjacent. Suitable excavated materials shall not be removed from the site unless they are surplus to the requirements of the work and then only with the written approval of the Owner's Representative. Excess suitable material not incorporated in the work and unsuitable material shall be transported to a contractor furnished disposal site.
 - 3. The excavation shall conform to the limits shown on the drawings and as directed by the owner's representative, within a tolerance of 0.10 feet. Excavation beyond the limits indicated on the drawings is not permitted without written approval. The Owner's Representative is to be notified 24 hours in advance of Contractors need for after excavation surveys. Payment for excavation will be based on typical sections shown on the drawings, and as directed by the Owner's Representative.
 - 4. Excavation shall be performed in a manner that will not endanger adjacent structures or improvements. Contractor shall shore excavations and trenches as required to avoid damaging existing roadways or structures.
 - 5. Where unusable soils are encountered in the subgrade within the specified depth below finish grade as indicated on the Drawings, the Contractor shall excavate to a depth such that usable soils are uncovered or the depth below finished grade as directed by the Owner's Representative. The excavations shall be uniformly shaped so that classified backfill material can be properly placed and compacted. The area shall be feathered to adjoining areas where usable material is found. Excavated area shall not be backfilled until cross sectional elevations and measurements of the area excavated have been taken.

- B. Dewatering
 - 1. The Contractor shall plan his operation in a sequence that will provide drainage at all times. The excavation shall be shaped to drain and shall be maintained in a dry condition, free of puddles or holes where water may accumulate. Any areas that cannot be so drained shall be kept free of standing water by pumping, if necessary. Unless otherwise provided in the Specifications, all Work associated with pumping or dewatering shall be considered incidental to the Contract and no separate payment shall be made.
- C. Roadways, Parking Areas, Building Pad and Paved Parking Areas
 - 1. Excavation shall be carried to the subgrade elevations required for the placement of classified material and to such additional depths as required to remove unsuitable material as directed by the Owner's Representative.
 - 2. Classified fill shall only be placed on a dewatered, non-saturated subgrade and shall not be placed until the subgrade has been approved in writing by the Owner's Representative.
- D. Additional Excavation
 - 1. The Owner's Representative will inspect and approve the various subgrade areas as they are excavated. He may direct that soils found to be excessively soft, wet, or otherwise unsuitable below the subgrade elevations shall be removed.
 - 2. The Contractor shall promptly perform all such additional excavation that is authorized in writing.
 - 3. The resulting additional excavation will be measured for unit price payment.
 - 4. Backfill shall match sections shown on the Drawings.
- G. Over Excavation
 - 1. Over excavation shall be restored by the Contractor by backfilling with Type IIA classified material and compacting to 95% of the maximum density at no cost to the Owner.
- H. Stability of Excavations
 - 1. The Contractor shall slope the sides of excavations to the angle required for safety, or shore and brace where sloping is not possible either because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling, by scaling, benching, shelving or bracing. Take precautions to prevent slides or cave-ins when excavations are made in locations adjacent to backfilled excavations, and when sides of excavations are subjected to vibrations from vehicular traffic or the operation of machinery, or any other source. In all cases the sides of all excavations shall be constructed to satisfy the requirements set forth in the local, state, and federal safety regulations regarding shoring and slope angle.

I. Cold Weather Protection

- 1. The subgrade must be kept from freezing from the time earthwork begins until final grades have been achieved or backfill is done, unless specified otherwise, in writing, by the Owner's Representative.
- 2. All subgrade which is allowed to freeze shall be thawed and compacted to 95% of the maximum density by the Contractor at no expense to the Owner, unless specified otherwise, in writing, by the Owner's Representative.

3.03 FILL AND BACKFILL

- A. General
 - 1. Fill and backfill consists of the placement of classified and/or unclassified material in layers to the required elevations.
 - 2. The subgrade shall be cleared of all debris and organic material. All depressions or holes below the general area surface level, whether caused by removal of debris or unacceptable material, or otherwise, shall be backfilled with approved material and compacted to specified density and to a level, uniform surface before the placement of other layers. Embankment shall not be placed on frozen ground, nor on ground having a slope greater than one vertical to four horizontal (slope 1:4).
 - 3. The specified material shall be constructed at the locations and to the lines and grades indicated on the Drawings. The material shall be placed and spread uniformly in successive layers not exceeding twelve inches (12") in loose thickness. The Owner's Representative may approve lifts of greater thickness provided the equipment and method used will consistently achieve the specified density. The layers shall be carried up full width from the bottom of the fill to avoid the necessity of widening the edges after the center has been brought to grade. Each layer shall be compacted to not less than ninety-five percent (95%) of the maximum density at optimum moisture as determined by the method of testing noted in Testing section. Reasonable time shall be provided to the Owner's Representative to make field density determinations prior to placement of successive layers of material.
 - 4. Blading, rolling, and tamping shall continue until the surface is smooth, free from waves and irregularities, and conforms to elevations shown on the Drawings. If at any time the material is excessively wet, it shall be aerated by means of blade graders, harrows, or other suitable equipment until the moisture content is satisfactory. The surface shall then be compacted and finished as specified above.
 - 2. All excavated materials meeting the requirements for classified and unclassified materials shall be incorporated into the work unless they are surplus to the requirements of the work and the Owner's representative has given written approval not to use the material.
 - 4. Fills and backfills shall be constructed in lifts of twelve (12) inches maximum thickness, (six inches maximum thickness if hand operated compactors are used) and compacted

to not less than 98% of maximum density. The finished surface of fills and backfills shall be smooth with no soft or yielding areas and shall be graded to not more than 0.05 feet above or below the design grade.

- 5. The Contractor shall backfill excavations as promptly as the work permits, but not until completion of the following:
 - a. Owner's acceptance of construction below finish grade such as culverts, subdrains, and other utilities.
 - b. Inspection, testing, approval, and recording locations of underground utilities.
 - c. Removal of shoring and bracing, and backfilling of any resulting voids with satisfactory materials. Cut off temporary sheet piling driven below the bottom of structures and remove in a manner to prevent settlement of the structure or utilities; or leave in place if required.
 - d. Removal of trash and debris.
 - e. Placement of permanent or temporary horizontal bracing on earth retaining wall.
- C. Trench Bedding
 - 1. Trench Bedding shall only be used where directed by the Owner's Representative, when required due to wet trench conditions.
- D. Cold Weather Protection
 - 1. The fill and backfill must be kept from freezing from the time earthwork begins until final surfacing is complete, unless work is discontinued due to a seasonal shutdown. In the event work is suspended due to a seasonal shutdown, such as winter, the ground shall be completely thawed to all depths prior to resuming work.
 - 2. All fill and backfills which is allowed to freeze shall be thawed and compacted to 95% of the maximum density by the Contractor at no expense to the Owner, unless specified otherwise, in writing, by the Owner's Representative.

3.04 GEOTEXTILES

- A. Geotextile Fabric
 - The subgrade shall be shaped according to the typical section shown on the drawings and as directed. The subgrade shall be free of large rocks, sticks, and deleterious material. Fabric shall be installed in full roll widths. All end and side joints shall be overlapped 2 feet minimum.
 - 2. Where manholes, valve boxes, or other items will penetrate the fabric, the fabric shall be neatly cut in the shape of the penetration. A second piece of fabric shall then be placed on top of the main fabric. The second piece shall extend at least four feet in all directions from the penetration.

3. Fill and backfill shall be dumped and spilled over the fabric. No equipment shall operate directly on the filter fabric. Filter fabric must be covered with at least one foot of classified material backfill before equipment is allowed to operate over it.

3.05 TOPSOIL

A. General

The Work under this Section consists of providing all operations pertaining to furnishing, transporting, and spreading of topsoil.

B. Materials

Topsoil furnished by the Contractor shall consist of a natural friable surface soil without admixtures of undesirable subsoil, refuse, or foreign materials. It shall be shredded and free from roots, hard clay, rocks larger than one inch (1") in any dimension, noxious weeds, seeds or plant propagules, tall grass, brush, sticks, stubble, or other litter, and shall have indicated by a healthy growth of crops, grasses, trees, or other vegetation that it is free-draining and non-toxic. Topsoil shall contain not more than ten percent (10%) gravel by dry weight of total sample. For the purposes of this specification gravel is defined per ASTM D422 modified to include only material passing one inch (1") and retained on the No. 4 sieve.

Topsoil shall conform to the following requirements, as tested using the procedures included in ASTM D422, ASTM D2974 and AASHTO T267. The topsoil shall be inspected and tested by the Engineer before approval will be granted for its use.

	Topsoil Mix
Organic Material*	15 to 25% by total sample dry weight
Silt	25 to 45% by dry weight
Sand	35 to 55% by dry weight

*Organic matter is to be determined by loss-on-ignition of oven-dried material in accordance with ASTM D2974.

Organic material for incorporation into topsoil, shall be partially decomposed peat moss. Organic material shall be from a source above the water table. Peat moss may require chopping or shredding to insure thorough mixing with the topsoil.

C. Placing

Placement of Topsoil shall not occur until the project area has been inspected and approved by the Engineer.

The topsoil shall be evenly spread on the designated areas to a depth of four inches (4") after settlement unless otherwise specified on the Drawings. Contractor shall not place or spread topsoil when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the Work.

Settlement for seeded areas shall be achieved by rolling the topsoil with a water-filled drum approved by the Engineer. The Engineer may direct that topsoil placed on slopes be track-

walked perpendicular to the slope with a small track dozer. Track walking shall be incidental to this bid item and no separate payment shall be made.

Topsoil in planting beds shall be at the depth shown on the Drawings, but no less than twelve inches (12").

Contractor shall keep roadway surfaces within the project and on haul routes clean during hauling and spreading operations.

3.06 SEEDING

A. General

The Work under this Section shall consist of providing all labor, equipment, and materials for the preparation of ground surfaces for the application and maintenance of seeded areas, fertilization, lime application (if necessary), watering, and mulching at locations shown on the Drawings or established by the Engineer.

All seeding shall be performed between May 1 and September 1. Seeding any other time will only be allowed upon written approval from the Engineer. Seeding shall not be done during windy conditions or when climatic or ground conditions would hinder placement or proper germination of seed mixes.

B. Materials

1. Seed

Seed shall be certified and shall be furnished in standard containers with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the Engineer duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within a 9 month period prior of application. This statement shall include name and address of laboratory, date of test, lot number for each kind of seed, and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for each kind of seed furnished and, in case of a mixture, the proportions of each kind of seed. Seed that has become wet, moldy, or otherwise damaged in transit or storage will not be acceptable.

The Contractor shall submit to the Engineer a certification tag for the seed mixes provided listing species, proportion by weight, percent purity, and percent germination. The certification tag shall come from the specified seed mixes and be removed from the unopened bags in the presence of the Engineer. Contractor shall deliver seed to the site in its original unopened container, which shall bear the vendor's guarantee of analysis.

Seed shall conform to one of the following seed mix:

Mowable Seed Mix – Application Rate: 5 lbs. / 1,000 s.f.

NAME

PROPORTION BY WEIGHT

PURITY GERMINATION

NIKISKI FIRE STATION NO. 3 NIKISKI, ALASKA KENAI PENINSULA BOROUGH			DIVISION 31 SECTION 31 20 00 EARTH MOVING
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Annual Ryegrass	5%	90%	85%
(Lolium multiflorum)			
Kentucky Bluegrass – Kenai	30%	90%	85%
(Poa pratensis "Kenai")			
Kentucky Bluegrass – Alene	25%	90%	85%
(Poa pratensis)			
Boreal Fescue	40%	90%	85%

(Festuca rubra 'Boreal')

2. Fertilizer

Fertilizer shall be a standard inorganic or organic commercial grade supplied separately or in mixtures and furnished in moisture-proof containers. Each container shall be marked with the weight and the manufacturer's guaranteed analysis of the contents showing the percentage for each ingredient contained therein. The proportion of chemical ingredients furnished shall be a mixture such as to provide the total available nitrogen, phosphoric, and potassium as required by the soil analysis or as specified in the Special Provisions. At least five (5) days prior to placement, the Contractor shall submit to the Engineer for approval an analysis of the proposed fertilizer and Manufacturer's Certificate of Compliance indicating Specifications are met.

Tolerances of the chemical ingredients shall be plus or minus two percent (+/- 2%).

No cyanamid compounds or hydrated lime will be permitted in mixed fertilizers.

3. Fertilizer

Limestone shall contain not less that eighty-five percent (85%) of calcium and magnesium carbonates. Agricultural ground limestone suitable for application by a fertilizer spreader shall conform to the following gradation:

Sieve Designation	Minimum Percent Passing, by Weight	
# 10	100	
# 20	90	
# 100	50	

Fertilizer and limestone for use in a hydraulic sprayer shall be soluble or ground to a fineness that will permit complete suspension of insoluble particles in water.

4. Mulch

Shall be dried shredded peat moss or cellulose wood or paper fiber such as "Astromulch," Eco Fiber," "Conwed," or approved equal.

5. Water

Water used in all operations shall be of potable quality.

- C. Application
 - 1. Soil Preparation

After grading of areas has been completed in conformity with the lines and grades shown on the Drawings, and before beginning seeding operations, the areas to be seeded shall be cultivated to provide a reasonably firm but friable seedbed. Cultivation shall be carried to a depth of two inches (2"). On slopes steeper than 3:1, depth of cultivation may be reduced as directed by the Engineer. All cultivated areas shall be raked or cleared of stones (one inch [1"] in diameter and larger), weeds, plant growth, sticks, stumps, and other debris or irregularities which might interfere with the seeding operation, germination of seed, or subsequent maintenance of the seed-covered areas. Contractor may be required to track-walk slopes 2:1 or over as directed in the Drawings or by the Engineer.

2. Fertilizer

Fertilizer used with topsoil shall be applied at a rate to provide two (2) pounds actual Nitrogen per thousand (1,000) square feet of area. In the absence of soil tests and direction from the Engineer, the Contractor shall apply 16-16-16 at the rate of twelve and one-half (12.5) pounds per thousand (1,000) square feet.

When applying a fertilizer used with the soil amendment, the Contractor shall apply a natural /organic based fertilizer with 25% slow release materials such as Arctic Gro Biotic Fertilizer. The organic based fertilizer shall have a minimum guaranteed analysis of 10-10-10-8.5S. It should provide a minimum of 10% (N) nitrogen, 10% (P) phosphate, 10% (K) potash, and 8.5% (S) sulfur. The fertilizer shall contain Humic DG (Dispersing Granule) to promote microbial growth and soil fertility and Sustane Organic for greater root development. It should be in a granular form that is easily spread. Apply at five hundred pounds per acre (500 lbs/acre).

3. Limestone

Limestone, whether in liquid or dry form, shall be applied at a sufficient rate to attain a soil pH between 6.0 and 7.0.

4. Application Methods

All machinery shall be free of invasive weeds, seeds, or plant propagules. Apply seed mixtures at rates as specified and/or as directed by the Engineer. Seed, fertilizer, limestone, mulch, and water may be applied by the following methods:

a. Hydraulic Method

Seeding by hydraulic methods shall consist of furnishing and placing a slurry made of seed, fertilizer, dried peat moss or cellulose wood fiber and water.

The dried peat moss or cellulose wood fiber shall be added to the water slurry in the hydraulic seeder after the proportionate amounts of seed and fertilizer
have been added. The slurry mixture shall then be combined and applied in such a manner that the rate of application will result in an even distribution of all materials.

Hydraulic seeding equipment shall be capable of maintaining a continuous agitation so that a homogeneous mixture can be applied through a spray nozzle. The pump shall be capable of producing sufficient pressure to maintain a continuous, non-fluctuating spray capable of reaching the extremities of the seeding area with the pump unit located on the roadbed. Sufficient hose shall be provided to reach areas not practical to seed from the nozzle unit situated on the roadbed.

b. Dry Method

Mechanical spreader, seed drills, landscape seeder, cultipacker seeder, fertilizer spreader, or other approved mechanical spreading equipment may be used when seed and fertilizer are to be applied in dry form. Fertilizer shall be spread separately at the specified rates, and then incorporated in one operation to a minimum depth of two inches (2"). Seeded areas shall be compacted within twenty-four (24) hours from the time the seeding is completed, weather and soil conditions permitting, by cultipacker, roller or other equipment satisfactory to the Engineer. Compacting equipment shall be operated at right angles to the slope. Compaction shall not be performed when the soil is in such condition that it will be picked up by the equipment, nor shall heavy soils be compacted unless directed by the Engineer.

c. Hand Method

Hand broadcasting by means of portable, hand operated mechanical spreaders or "by hand" may be substituted for the preceding two (2) methods provided that the application rate is twice that of the dry method, and that the application is applied in a minimum of two (2) passes over the areas to be seeded (at ninety degrees [90°] to one another in order to assure uniform and even coverage to all seeded surfaces).

- D. Maintenance
 - 1. General

The Contractor shall furnish all labor, materials, supplies and equipment required to establish, maintain, and protect the planted and seeded areas, for a one year Plant Establishment Period from date of acceptance of the initial planting operations. However, maintenance activities shall commence immediately after each item is planted or when areas have been seeded.

The Contractor shall supply a maintenance schedule to the Engineer, thirty (30) days prior to the landscape inspection. The Contractor shall also be responsible for protection of his work during the maintenance period, and shall repair and replace all

materials and seeded areas damaged or destroyed within the scope of the Work, regardless of cause.

The Contractor's staff shall include supervisory personnel experienced in landscape maintenance. The Work Force is to be experienced and familiar with maintaining plant material in subarctic conditions.

Contractor shall replace any tree or shrub damaged by vandalism, a lawnmower, weed whip or other equipment at no additional cost to the Owner.

2. Watering

A proposed watering schedule shall be submitted to the Engineer thirty (30) days prior to installation of plant materials. The Contractor shall notify the Engineer of watering activities. The Contractor shall keep a log of date, time of day, and amount of water used for every watering activity.

The Contractor shall deep water all trees and shrubs, providing water penetration throughout the root zone to the full depth of the planting pits. Deep water application shall be applied at a low pressure application rate using hand watering with a hose with a minimum of water run-off.

Watering shall cease at first hard frost in the fall and shall resume upon ground thaw in the spring.

If at any time during the maintenance period weather conditions (such as extended period with no rain or continuous drying winds) cause the plant root zone to dry out, the Engineer may direct the Contractor to deep water all trees and shrubs. Contractor shall provide supplemental watering immediately and at no additional cost to the Owner.

Should soil conditions be encountered that are not conducive to water absorption, the Contractor shall take whatever corrective actions that may be required to correct this condition, without additional cost to the Owner.

Turf, seeded, bulb areas, and annual flower beds shall be watered at such frequency as weather conditions require to maintain soil moisture within the root zone. When establishing turf and seeded areas, the soil shall be watered often enough to maintain a moist seedbed to promote healthy seed germination resulting in an even and uniform coverage. If the Contractor does not provide adequate watering as required by the Engineer, the Engineer will hire others to perform this task and deduct costs from final payment to the Contractor.

The Contractor shall protect seeded areas from damage from all traffic, whether people, animals, on or off road vehicles, or any other causes which may damage newly seeded and maintained surfaces. Contractor shall maintain a minimum coverage of 90%. Surfaces damaged shall be repaired by regrading, reseeding (including all specified amendments), as directed by the Engineer, at no additional cost to the Owner. The Contractor shall otherwise maintain seeded areas, including regular mowing, in a satisfactory condition until Seeding Acceptance.

On the fortieth (40th) day of the maintenance period, the Contractor shall apply one application of fertilizer (16-16-16) at the rate of seven (7) pounds per thousand (1,000) square feet.

- E. Seeding Acceptance
 - 1. Acceptance

A Landscaping Acceptance Inspection of the project will occur after completion of the Plant Establishment Period. Engineer shall verify that Contractor performed maintenance functions as identified above. If the Engineer does not accept the improvements, the Contractor shall correct all deficiencies. All costs associated with correcting the deficiencies and extending the Plant Establishment Period shall be paid by the Contractor without additional cost to the Owner, until all Work is complete and accepted by the Engineer.

END OF SECTION

SECTION 31 20 10

GEOTEXTILES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. W The Work under this Section shall consist of furnishing and installing Geotextile Fabric for embankment separation, subgrade reinforcement of roadways, subsurface drainage, or riprap lining in a manner and at locations as shown in the Drawings or as directed by the Engineer.

1.02 SUBMITTAL REQUIREMENTS

- A. The following information shall be submitted to the Engineer for review and acceptance:
 - 1. Full-scale laboratory testing and in-ground testing of pavement structures reinforced with the proposed geotextile product which illustrates significant structural contribution of the geotextile product to the pavement structure.
 - 2. Certified test results stating that the geotextile product meets the material and physical properties in all respects.
 - 3. Guidelines to pavement design using proposed geotextile product.
 - 4. A list of not less than ten (10) comparable projects, in terms of size and application, in the United States, with references and phone numbers, where the results of the proposed geotextile product's use can be verified after a minimum of three years continuous service life.
 - 5. Geotextile product samples and certified material property data sheets.
 - 6. Recommended installation instructions.

PART 2 PRODUCTS

- 2.01 Type A Geotextile–for separation
 - A. Type A Geotextile shall be used for separation. The Type A Geotextile shall be a woven or nonwoven pervious fabric constructed from long chain polymeric filaments such as polypropylene, polyethylene, polyester, polyvinylidene chloride or polyamide formed into a stable network such that the filaments or yarns retain their relative position to each other. The geotextile shall be inert to commonly encountered chemicals and shall be free from defects.
 - B. Non-woven geotextile may be formed by the needle-punched, spun-bonded or melt-bonded process.
 - C. Woven geotextile shall be a pervious sheet of yarn woven into a uniform pattern with distinct and measurable openings. Edges of the cloth shall be salvaged to prevent the outer yarn from pulling away from the cloth.
 - D. Acceptance of geotextile material is to be determined according to ASTM D-4873.
 - E. Geotextile manufacturer shall provide a letter certifying that its geotextile product meets the

specified requirements.

F. Type A Geotextile supplied shall meet the physical and mechanical properties as follows:

	Type A Geotextile		
Geotextile Property	Test Method	Value ⁽¹⁾	
Tensile Strength, lbs., min.	ASTM D-4632	180	
Tensile Elongation, %	ASTM D-4632	30	
Burst Strength, psi.	ASTM D-3786	400	
Trapezoid Tear, lbs.	ASTM D-4533	70	
Puncture Strength, lbs.	ASTM D-4833	70	
Permittivity, Sec	ASTM D-4491	0.02	
Ultraviolet Resistance, %	ASTM D-4355	70	
Apparent Opening Size (AOS),	ASTM D-4751	50	
US Sieve			

Notes:

(1)Percent of tensile strength retained per ASTM D-4632 after conditioning of 500 hours in accordance with ASTM D-4355.

(2)Minimum Average Roll Values

- 2.02 Type B Geotextile for Subgrade Reinforcement
 - A. Type B Geotextile shall consist of a regular grid structure formed by biaxially drawing a continuous sheet of select polypropylene material; it shall have aperture geometry and rib and junction cross sections sufficient to permit significant mechanical interlock with the material being reinforced.
 - B. Type B Geotextile shall have high flexural rigidity and high tensile strength at ribs and junctions of the grid structure.
 - C. Type B Geotextile shall maintain its reinforcement and interlock capabilities under repeated dynamic loads while in service and shall also be resistant to ultraviolet degradation, to damage under normal practices, and to all forms of biological or chemical degradation normally encountered in the material being reinforced.
 - D. Type B Geotextile shall meet the mechanical and physical properties listed below:

Test Method	Value
	Test Method

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-MD, inch -CMD, inch Open Area, % Thicknoss	COE Method	1.0 (nom) 1.3 (nom) 70 (min)
-ribs, inch -junctions, inch Secant aperture stability ₍₄₎ modulus @ 20cm-kg/deg	Grid Aperture Test UAF	0.03 (nom) 0.11 (nom) 3.20
REINFORCEMENT <u>Flexural rigidity</u> -MD, mg-cm -CMD, mg-cm <u>Tensile modulus</u> -MD, pound/foot -CMD, pound/foot	ASTM D-1388 ⁽⁶⁾ GRI-GG1 ⁽⁷⁾	250,000 (min) 270,000 (min) 14,000 (min) 20,000 (min)
<u>Junctions</u> -Strength -MD, pound/foot -CMD, pound/foot -Efficiency -MD, % -CMD, %	GRI-GG2 ⁽⁸⁾ GRI-GG2 ⁽⁸⁾	765 (min) 1,260 (min) 90 (min) 90 (min)
<i>MATERIAL</i> Polypropylene, % Grade 2 Carbon black, %	ASTM D-4101 Group 1/Class 1/ ASTM D-4218	98 (min) 0.5 (min)

Notes:

- (1) MD dimension is along roll length. CMD dimension is across roll width.
- (2) Maximum inside dimension in each principal direction measured by calipers.
- (3) Percent open area measured without magnification by Corps of Engineers method as specified in CW 02215 Civil Works Construction Guide, November 1977.
- (4) Secant aperture stability modulus value listed is equal to the mean value less approximately one standard deviation.
- (5) Grid Aperture Stability Test developed by Dr. T. Kinney at the University of Alaska, Fairbanks.
- (6) ASTM D-1388 modified to account for wide specimen testing.
- (7) Secant modulus at 2% elongation measured by Geosynthetic Research Institute test method GG1 "Geogrid Tensile Strength." No offset allowances are made in calculating secant modulus.
- (8) Geogrid junction strength and junction efficiency measured by Geosynthetic Research Institute test method GG2 "Geogrid Junction Strength."
- E. Geotextile manufacturer shall provide a letter certifying that its geotextile product meets the specified requirements.

- 2.03 Type C Geotextile for drainage or rip rap lining.
 - A. Type C Geotextile shall be used for drainage or riprap lining. The geotextile shall be constructed from long chain polymeric filament or yarns such as polypropylene, polyethylene, polyester, nylon, polyvinylidene chloride or polyamide formed into a stable network such that the filaments or yarns retain their relative position to each other. The geotextile shall be inert to commonly encountered chemicals and shall be free from defects.
 - B. Non-woven geotextile may be formed by the needle punched, spun-bonded or melt-bonded process.
 - C. Woven geotextile shall be a pervious sheet of yarn woven into a uniform pattern with distinct and measurable openings. Edges of the cloth shall be salvaged to prevent the outer yarn from pulling away from the cloth.
 - D. The geotextile fabric supplied shall meet the physical and mechanical properties listed below:

		Subsurface	Riprap Liner	
Geotextile Property	Test Method	Drainage	Unprotected(1)	Protected(2)
Tensile Strength, lbs.	ASTM D-4632	90	200	90
Elongation, %	ASTM D-4632	N/A	15-70	15-70
Burst Strength, psi	ASTM D-3786	125	320	140
Puncture Strength, lbs.	ASTM D-4833	25	80	40
Trapezoid Tear, lbs.	ASTM D-4533	25	50	30
Apparent Opening Size	ASTM D-4751	70 min. (3)	(4)	
Seam Strength, Ibs.	ASTM D-4632	N/A	180	80
Permittivity	ASTM D-4491	50	0.5	0.5
		(gal./min.ft.2)	(sec1)	(sec1)
Ultraviolet Degradation ⁽⁵⁾ , %	ASTM D-4355	70	70	70

Subsurface/Riprap Liner Geotextile

Notes:

- (1)Unprotected Erosion Control applications are those in which fabrics are used under conditions where installation stresses are more severe than Class B, i.e., stone placement height should be less than three feet (3') and stone weights should not exceed two hundred fifty (250) pounds.
- (2)Protected Erosion Control applications are those in which fabrics are used in structures or under conditions in which the fabric is protected by sand cushions or by "zero drop height" placement of stone.
- (3)Soil with 50% or less particles by weight passing US No. 200 Sieve.

(4)Soil with more than 50% particles by weight passing US No. 200 Sieve.

- (5)Percent of minimum tensile strength (ASTM D-4632) retained after weathering per ASTM D-4533 for 500 hours.
- E. Acceptance of geotextile material shall be determined according to ASTM D-4759.
- F. Geotextile manufacturer shall provide a letter certifying that its geotextile product meets the specified requirements.

PART 3 EXECUTION

- 3.01 Surface Preparation
 - A. Prepare surface by removal of stumps, boulders, and sharp objects in accordance with Section 311000 SITE CLEARING. Contractor shall fill holes and large ruts with material shown on the Drawings or as approved by the Engineer.
 - B. Clearing shall be considered incidental to this item. Material used to fill ruts and holes shall be paid for at the unit price for the type of material used, as shown on the Drawings or as approved by the Engineer.
 - C. In Areas to Be Surcharged: All trees and brush having a trunk base diameter greater than onehalf inch (1/2") shall be cut to within two inches (2") of original ground surface. Grass shall be flattened with no more than two passes of a tracked vehicle.
- 3.02. Geotextile Placement
 - A. Unroll geotextile directly onto the prepared surface. Exposure of geotextile to the elements after removal of protective covering shall not exceed five days.
 - B. Unroll geotextile for embankment reinforcement parallel to the embankment centerline.
 - C. Geotextile shall be placed in daily work sections so the lap adjustment can be made should movement of the geotextile occur during placement of fill.
- 3.03 Joining
 - A. Type A Geotextile
 - 1. Fabric shall be joined with adjacent pieces of fabric by sewing or overlapping.
 - 2. If fabric is sewn, the fabric shall have all seams sewn by butterfly or J-seams and shall develop a minimum of eighty-five percent (85%) of the specified strength. Seams shall be sewn with a double-thread chain-lock stitch. High strength polyester, polypropylene or Kevlar thread shall be used. The seam shall be one and one-half inch plus or minus one-quarter inch $(1-1/2" \pm 1/4")$ from the outside edge of the geotextile.
 - B. Type B Geotextile
 - 1. Sections shall be overlapped a minimum of three feet (3'), or as shown on the Drawings, to prevent shifting of geotextile during installation and filling.
 - 2. Lap joints shall be tied with plastic ties specifically manufactured for this purpose at five

foot (5') intervals.

- C. Type C Geotextile
 - 1. Fabric shall be joined with adjacent pieces of fabric by sewing or overlapping.
 - 2. If fabric is sewn, the fabric shall have all seams sewn by butterfly or J-seams and shall develop a minimum of eighty-five percent (85%) of the specified strength. Seams shall be sewn with a double-thread chain-lock stitch. High strength polyester, polypropylene or Kevlar thread shall be used. The seam shall be one and one-half inch plus or minus one-quarter inch (1-1/2" ±1/4") from the outside edge of the geotextile. If the fabric is overlapped, the sections shall be overlapped a minimum of three feet (3') or as shown on the Drawings.
- 3.04 Material Placing and Spreading
 - A. Fill material placement shall not occur until the Engineer accepts surface preparation and geotextile laps.
 - B. Contractor shall maintain minimum laps and fabric continuity without fabric loops or kinks during material placement and spreading.
 - C. Follow the manufacturer's recommendations for material placing and spreading of the geotextile. During placing and spreading, the Contractor shall maintain a minimum depth of one foot (1') of cover material at all times between the fabric and the wheels or tracks of the construction equipment. At no time shall equipment operate on the unprotected geotextile. Construction equipment shall not make sudden stops, starts, or turns on the cover material. Use a smooth drum roller to achieve the specified density.
 - D. Spread the material in the direction of the fabric overlap.
 - E. On weak subgrade, spread the cover material simultaneously with dumping to minimize the potential of a localized subgrade failure.
- 3.05 Geotextile Repair
 - A. Should it be determined during or after embankment construction that specified geotextile lap widths have not been achieved, or that the Contractor otherwise damaged the installed geotextile, the Contractor shall correct the geotextile installation at no additional cost to the Owner.
 - B. The Contractor shall expose the geotextile and add additional geotextile extending in all directions to achieve specified laps and anchorage. After correcting the geotextile, the embankment shall be reconstructed in accordance with the Contract Documents.

END OF SECTION

SECTION 31 23 20

EROSION SEDIMENT AND POLLUTION CONTROL

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. The Work described in this Section shall consist of providing all labor, equipment, materials, and services to prepare, implement, and maintain a Storm Water Pollution Prevention Plan (SWPPP) for projects that may adversely impact receiving waters or waters of the United States. The type of plan required depends on the area disturbed by the project including the construction site and off-site activities which include, but may not be limited to, material sites, waste disposal sites, borrow and fill sites, and equipment and material storage areas.

A SWPPP is required for all Projects that disturb one or more acres of land.

As a requirement of this Contract, the Contractor shall accept a delegation of authority from the Kenai Peninsula Borough (KPB) to act as the Borough's duly authorized representative for the purpose of overseeing compliance with the APDES Construction Permit at the project site. Plan, provide, inspect, and maintain control of erosion, sedimentation, water pollution, and hazardous materials contamination.

1.02 DEFINITIONS

- A. Alaska Certified Erosion and Sediment Control Lead (AK-CESCL) A person who has completed training, testing, and other requirements of, and is currently certified as, an AK-CESCL from an AK-CESCL Training Program. KPB recognizes AK-CESCLs as "qualified personnel" required by the CGP. An AK-CESCL shall be recertified every three years.
- B. Alaska Department of Environmental Conservation (ADEC) The State agency authorized by EPA to administer the Clean Water Act's National Pollutant Discharge Elimination System (NPDES).
- C. Alaska Pollutant Discharge Elimination System (APDES) A system administered by ADEC that issues and tracks permits for storm water discharges.
- D. Best Management Practices (BMP) Temporary or permanent structural and nonstructural devices, schedules of activities, prohibition of practices, maintenance procedures, and other management practices to prevent or minimize the discharge of pollutants to waters of the United States. BMPs also include, but are not limited to, treatment requirements; operating procedures; practices to control site runoff, spillage or leaks; sludge or waste disposal; or drainage from material storage.
- E. Clean Water Act (CWA) Federal Water Pollution Control Amendments of 1972, as amended (33 U.S.C. 1251 et seq.).
- F. Construction Activity Work by Contractor, subcontractor or utility company within the project area, that may result in erosion, sedimentation, or a discharge of pollutants into storm water.

Construction Activity includes soil disturbing activities (e.g. clearing, grubbing, grading, excavating); construction materials or equipment storage or maintenance areas (e.g. material piles, borrow area, concrete truck chute wash down, fueling); and activities that may discharge storm water and are directly related to the construction process (e.g. concrete or asphalt batch plants).

- G. Construction General Permit (CGP) The current permit authorizing storm water discharges from Construction Activities, issued and enforced by ADEC. The CGP authorizes storm water discharges provided permit conditions and water quality standards are met.
- H. Electronic Notice of Intent (eNOI) The electronic Notice of Intent submitted to ADEC to obtain coverage under the CGP.
- I. Electronic Notice of Termination (eNOT) The electronic Notice of Termination submitted to ADEC to end coverage under the CGP.
- J. Environmental Protection Agency (EPA) A federal agency charged to protecthuman health and the environment.
- K. Final Stabilization A point in time when all ground-disturbing activities are complete and permanent erosion and sediment controls are established and functional. The stabilized site is protected from erosive forces of raindrop impact and water flow. Typically, all unpaved areas except graveled shoulders, crushed aggregate base course, or other areas not covered by permanent structures are protected by either a uniform blanket of perennial vegetation (at least 70% cover density) or equivalent permanent stabilization measures such as riprap, gabions or geotextiles. See CGP for further definition.
- L. Hazardous Material Control Plan (HMCP) The Contractor's detailed project specific plan for prevention of pollution from storage, use, transfer, containment, cleanup, and disposal of hazardous material (including, but not limited to, petroleum products related to construction activities and equipment). The Contractor shall include the HMCP as an appendix to the SWPPP.
- M. Inspection An inspection required by the CGP or the SWPPP, usually performed together by the Contractor's SWPPP Manager and the KPB Inspector.
- N. Municipal Separate Storm Sewer System (MS4) Permit An ADEC storm water discharge permit issued to local governments (Municipality) and other public bodies, for operation of storm water conveyances and drainage systems. See CGP for further definition.
- O. Multi-Sector General Permit (MSGP) The Alaska Pollutant Discharge Elimination System General Permit for storm water discharges associated with industrial activity.
- P. Operator(s) The party or co-parties associated with a regulated activity that has responsibility to obtain permit coverage under the CGP. "Operator" for the purpose of the CGP and in the context of storm water associated with construction activity, means any party associated with a construction project that meets either of the following two criteria:
 - The operator has operational control over construction plans and specifications,

including the ability to make modifications to those plans and specifications; or

- The operator has day to day responsibility and operational control for all activities at a project which are necessary to fully comply with the CGP and the project SWPPP for the site or other requirements of the permit. For the purpose of a Contractor executing project Work under this Contract with KPB, the Contractor is the operator responsible for CGP and SWPPP coverage and compliance under the CGP for the Work.
- Q. Pollutant Any substance or item meeting the definition of pollutant contained in 40CFR §
 122.2. A partial listing from this definition includes: dredged spoil, solid waste, sewage, garbage,
 sewage sludge, chemical wastes, biological materials, wrecked or discarded equipment, rock,
 sand, cellar dirt, and industrial or municipal waste.
- R. Project Zone The Project Zone includes the area of street, road, highway or other facility under construction; project staging and equipment areas; and material and disposal sites, when those areas, routes and sites are directly related to the Contract.
- S. Records Any record, report, information, document, or photograph required to be created or maintained pursuant to the requirements of the CGP, the CGP storm water requirements of the Clean Water Act and applicable local, state, and federal laws and regulations pertaining to document preservation.
- T. Spill Prevention, Control and Countermeasure Plan (SPCC Plan) Contractor's detailed plan for petroleum spill prevention and control measures that conform to the requirements of 40 CFR 112.
- U. Spill Response Field Representative Contractor's representative with authority and responsibility for managing, implementing, and executing the HMCP and SPCC Plan.
- V. Storm Event A rainfall event that produces more than one half inch (0.5") of precipitation in twenty-four (24) hours and that is separated from the previous storm event by at least three (3) days of dry weather. Event can be measured on site using a rain gauge or Contractor can utilize the nearest National Weather Service (NWS) precipitation gauge station to determine the amount of rain fall during a storm event if the NWS gauge used is located within twenty (20) miles of the site.
- W. Storm Water Pollution Prevention Plan (SWPPP) Contractor's detailed projectspecific plan to minimize erosion and contain sediment within the Project Zone and to prevent discharge of pollutants that exceed applicable water quality standards. The SWPPP includes, but is not limited to the plan, amendments, records of activities, inspection schedules and reports, qualifications of key personnel, and all other documentation, required by the CGP and this specification, and other applicable local, state, and federal laws and regulations.
- X. Subcontractor Spill Response Coordinator The Subcontractor's Representative with authority and responsibility for coordinating the Subcontractor's activities in compliance with the HMCP and SPCC Plan.

- Y. Subcontractor SWPPP Coordinator The Subcontractor's Representative has responsible charge of and authority to direct the Subcontractor's Work; is responsible for the subcontractor's compliance with the SWPPP; and performs coordination with the Superintendent and SWPPP Manager.
- Z. Superintendent Contractor's duly authorized representative in responsible charge of the Work.
 The Superintendent has responsibility and authority for the overall operation of the Project and for Contractor-furnished sites and facilities directly related to the Project.
- AA. SWPPP Amendment A revision or document that adds to, deletes from, or modifies the SWPPP.
- AB. SWPPP Manager Contractor's qualified representative who conducts inspections, has authority to suspend work and implement corrective actions required for CPG compliance, except they do not have authority to prepare the initial SWPPP or sign inspection reports.
- AC. SWPPP Preparer Contractor's qualified representative who is responsible for developing the initial SWPPP.
- AD. Utility Spill Response Coordinator a utility's representative with authority and responsibility for coordinating the Utility's activities in compliance with the HMCP and SPCC Plan.
- AE. Utility SWPPP Coordinator a utility's representative with authority to direct the Utility's work, and who is responsible for coordination with the Superintendent and SWPPP Manager, and for the utility's compliance with the SWPPP.

1.03 SUBMITTALS.

- A. For all projects that disturb one acre or more of ground submit three copies each of your SWPPP and HMCP to the Owner's Representative for approval.
- B. Submit one copy of the SPCC Plan, if required, to the Owner's Representative. Sign all submittals. Deliver these documents to the Owner's Representative no less than five calendar days prior to the preconstruction conference.
- C. The SWPPP must contain a certification, and be signed by the Contractor. You must receive an approved SWPPP before you submit your eNOI.
- D. For projects that disturb five acres or more of ground, submit a copy of the approved and signed SWPPP, with the required permit fee to the Alaska Department of Environmental Conservation (ADEC) Storm Water Coordinator. Transmit proof of this submission to the Owner's Representative.
- E. Submit the signed eNOI to ADEC (electronic submission may be available). Submit copies of the signed eNOI to the Owner's Representative and to KPB. Transmit proof of Contractor's ADEC submission to the Owner's Representative. Allow adequate time for state and federal processing, prior to commencing ground-disturbing activities.

- F. The active status NOIs, approved SWPPP, approved HMCP, and submitted SPCC Plan (when required) become the basis of the work required for the project's erosion, sediment, and pollution control.
- G. When the Project is stabilized, as determined by the Owner's Representative, submit your signed eNOT to ADEC with a copy to the Owner's Representative.

2.01 STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS.

- A. For projects that disturb one acre or more of ground, Contractor must prepare a Storm Water Pollution Prevention Plan. Use the ADEC SWPPP Template based on Contractor's scheduling, equipment, and use of alternative BMPs or follow the format presented in the *Alaska Storm Water Pollution Prevention Plan Guide*. The plan must consider first preventing erosion, then minimizing erosion, and finally trapping sediment before it enters waterways.
- B. The plan must address your site-specific controls and management plan for the construction site as well as for all material sites, waste disposal sites, haul roads, and other affected areas, public or private. The plan must also incorporate all the requirements of the project permits.
- C. Specify the line of authority and designate your field representative for implementing SWPPP compliance. Designate one representative for each subcontractor who performs earth disturbing activities, or who install and maintain erosion and sediment control measures.

2.02 HAZARDOUS MATERIAL CONTROL PLAN (HMCP) REQUIREMENTS.

- A. Contractor shall prepare the HMCP for prevention of pollution from storage, use, containment, cleanup, and disposal of hazardous material, including petroleum products related to construction activities and equipment. Contractor shall append the HMCP to the SWPPP. Contractor shall compile Material Safety Data Sheets (MSDS) in one location and reference that location in the HMCP.
- B. HMCP shall designate a Contractor's Spill Response Field Representative and provide twentyfour- (24)-hour contact information. Contractor shall designate a Subcontractor Spill Response Coordinator for each Subcontractor. The Superintendent and Contractor's Spill Response Field Representative shall have twenty-four- (24)-hour contact information for each Subcontractor Spill Response Coordinator and the Utility Spill Response Coordinator.
- C. HMCP shall list and provide the location and estimated quantities of hazardous materials (including materials or substances listed in 40 CFR 117 and 302, and petroleum products) to be used or stored on the Project. Hazardous materials shall be stored in covered storage areas. Contractor shall provide secondary containment for all hazardous material storage areas.
- D. HMCP shall identify the locations where fueling and maintenance activities will take place and describe the activities, and list controls to prevent the accidental spillage of petroleum products and other hazardous materials. Controls include placing absorbent pads or other suitable containment under fill ports while fueling and under equipment during maintenance or repairs.

- E. HMCP shall use secondary containment under all stationary equipment (equipment that does not have a seat for driving) that contains petroleum products and use secondary containment under pumps, compressors, and generators.
- F. HMCP shall list the types and approximate quantities of response equipment and cleanup materials available on the Project, including a list and location map of cleanup materials at each different work site and readily available off site (materials sources, material processing sites, disposal sites, staging areas, etc). Spill response materials shall be stored in sufficient quantity at each work location, appropriate to the hazards associated with that site.
- G. HMCP shall describe procedures for containment and cleanup of hazardous materials. Contractor shall describe a plan for the prevention, containment, cleanup, and disposal of soil and water contaminated by spills and a plan for dealing with contaminated soil and water encountered during construction. Contractor shall clean up spills or contaminated surfaces immediately.
- H. HMCP shall describe methods of disposing of waste petroleum products and other hazardous materials generated by the Project, including routine maintenance. Contractor shall identify haul methods and final disposal areas and provide assurance that final disposal areas are permitted for hazardous material disposal.
- I. HMCP shall describe methods of complying with the requirements of AS 46.04.010-900, Oil and Hazardous Substances Pollution Control, and 18 AAC 75, including contact information for reporting hazardous materials and petroleum product spills to the Owner's Representative and reporting to federal, state and local agencies.
- 2.03 SPILL PREVENTION, CONTROL AND COUNTERMEASURE (SPCC) PLAN REQUIREMENTS.
 - A. Contractor shall prepare and implement an SPCC Plan when required by 40 CFR 112 and when both of the following conditions are present on the Project:
 - Oil or petroleum products from a spill may reach navigable waters (as defined in 40 CFR 112); and
 - Total above ground storage capacity for oil and petroleum products is greater than 1,320 gallons (not including onboard tanks for fuel or hydraulic fluid used primarily to power the movement of a motor vehicle or ancillary onboard oil-filled operational equipment, and not including containers with a storage capacity of less than 55 gallons)

HMCP and SWPPP shall reference the SPCC plan.

3.01 CONSTRUCTION REQUIREMENTS.

A. Do not begin ground-disturbing work until the ADEC has acknowledged receipt of NOI, and has listed it as active status. The ADEC will post the status of the NOIs on the ADEC website.

- B. Post at the construction site:
 - 1. APDES Permit number, if available, and a copy of the eNOI,
 - 2. Name and phone number of your local contact person, and
 - 3. Location of a SWPPP available for viewing by the public.
- A. Comply with all requirements of the approved HMCP, the submitted SPCC Plan, and all state and federal regulations that pertain to the handling, storage, cleanup, and disposal of petroleum products or other hazardous substances. Contain, clean up, and dispose of all discharges of petroleum products and/or other materials hazardous to the land, air, water, and organic life forms. Perform all fueling operations in a safe and environmentally responsible manner. Comply with the requirements of 18 AAC 75 and AS 46, Oil and Hazardous Substances Pollution Control. Report oil spills as required by federal, state and local law, and as described in your SPCC Plan.
- B. Comply with all requirements of the NPDES General Permit, implement all temporary and permanent erosion and sediment control measures identified in the SWPPP, and ensure that the SWPPP remains current. Maintain all temporary and permanent erosion and sediment control measures in effective operating condition.
- C. Perform inspections and prepare inspection reports in compliance with the project SWPPP and the NPDES General Permit.
 - 1. <u>Joint Inspections</u>. Prior to start of construction, conduct a joint on-site inspection with the Owner's Representative and the Contractor's field representative to discuss the implementation of the SWPPP. Conduct the following additional joint on-site inspections with the Owner's Representative:
 - a. During construction, inspect the following at least once every seven days and within 24 hours of the end of a storm exceeding 1/2 inch in 24 hours (as recorded at or near the project site):
 - (1) Disturbed areas that have not been finally stabilized
 - (2) Areas used for storage of erodible materials that are exposed to precipitation
 - (3) Sediment and erosion control measures
 - (4) Locations where vehicles enter or exit the site
 - b. Prior to winter shutdown, to ensure that the site has been adequately stabilized and devices are functional.
 - c. At project completion, to ensure final stabilization of the project.

- 2. <u>Winter Inspections</u>. During winter shutdown, conduct inspections at least once every month and within 24 hours of a storm resulting in rainfall of 1/2 inch or greater. The Owner's Representative may waive monthly inspection requirements until one month before thawing conditions are expected to result in a discharge, if all of the following requirements are met:
 - a. Below-freezing conditions are anticipated to continue for more than one month.
 - b. Land disturbance activities have been suspended.
 - c. The beginning and ending dates of the waiver period are documented in the SWPPP.
- 3. <u>Inspection Reports</u>. Prepare and submit, within three working days of each inspection, a report on state Form 25D-100, with the following information:
 - a. A summary of the scope of the inspection
 - b. Name(s) of personnel making the inspection
 - c. The date of the inspection
 - d. Observations relating to the implementation of the SWPPP
 - e. Any actions taken as the result of the inspection
 - f. Incidents of non-compliance

Where a report does not identify any incidents of non-compliance, certify that the facility is in compliance with the SWPPP and NPDES General Permit. Sign the report according to the Standard Permit Conditions of the NPDES General Permit, Part 8, Appendix G. Include all reports as an appendix to the SWPPP.

- D. Retain copies of the SWPPP, and all other records required by the NPDES General Permit, for at least three years from the date of final stabilization.
- E. If unanticipated or emergency conditions threaten water quality, take immediate suitable action to preclude erosion and pollution.
- F. Submit amendments to the SWPPP to correct problems identified as a result of any:
 - 1. Storm or other circumstance that threatens water quality, and
 - 2. Inspection that identifies existing or potential problems.

- I. Submit SWPPP amendments to the Owner's Representative within seven days following the storm or inspection. Detail additional emergency measures required and taken, to include additional or modified measures. If modifications to existing measures are necessary, complete implementation within seven days.
- J. Stabilize all areas disturbed after the seeding deadline within seven days of the temporary or permanent cessation of ground-disturbing activities.
- K. Submit a signed eNOT to ADEC and the Owner's Representative:
 - 1. When the project site (including all material sources, disposal sites, etc.) has been finally stabilized and all storm water discharges from construction activities authorized by this permit have ceased, or
 - 2. When the construction activity operator (as defined in the NPDES General Permit) has changed.
- L. If Contractor fails to coordinate temporary or permanent stabilization measures with the earthwork operations in a manner to effectively control erosion and prevent water pollution, the Owner may suspend Contractor's operations and withhold monies due on current estimates for such earthwork items until all aspects of the work are coordinated in a satisfactory manner.
- M. The Owner may, after giving written notice, proceed to perform such work and deduct the cost thereof, including project engineering costs, from Contractor's progress payments if Contractor fails to:
 - 1. Pursue work required by the approved SWPPP.
 - 2. Respond to inspection recommendations and/or deficiencies in the SWPPP.
 - 3. Implement erosion and sedimentation controls identified by the Owner's Representative.

END OF SECTION

ASPHALT PAVING

PART 1 - GENERAL

SECTION 32 12 16

1.01 DESCRIPTION

A. The Work covered by these Specifications consists of providing all plant, labor, equipment supplies, material, transportation, handling, and storage, and performing all operations necessary to complete the construction of hot mix asphalt concrete pavement consisting of one or more courses on a previously prepared base, seal coat of asphalt cement and cover aggregate, and bituminous surface treatment in single or multiple courses.

1.02 REFERENCE SPECIFICATIONS

All work in this section shall be in conformance to the "Standard Specifications for Highway Construction, 2015 Edition" of the Alaska Department of Transportation and Public Facilities (ADOT&PF), Section 401- Asphalt Concrete Pavement, and Section 703 – Aggregates, and as described in this Section.

1.03 REFERENCE STANDARDS

A. Testing Standards for Asphalt Concrete Pavement

- 1. Cores: ASTM D979-15. "Sampling Bituminous Paving Mixtures".
- 2. Core Density: ASTM D2726-17. "Bulk Specific Gravity and Density of Non-Absorptive Compacted Asphalt Mixtures".
- 3. Thickness: ASTM D3549-11. "Thickness and Height of Compacted Bituminous Paving Mixture Specimens".
- 4. Density: Alaska Test Method (ATM) 409. "Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt (HMA)".
- 4. Nuke Density: ASTM D2950-14. "Density of Bituminous Concrete in Place by Nuclear Methods".
- 5. Asphalt Content: ASTM D4125-10. "Asphalt Content of Bituminous Mixtures by the Nuclear Method".
- 6. Gradation: ASTM C136-14. "Sieve Analysis of Fine and Coarse Aggregates".
- 7. Marshall Analysis (Stability): ASTM D2726-17. "Bulk Specific Gravity and Density of Non-Absorptive Compacted Asphalt Mixtures".
- 8. Extraction: ASTM D2172-17. "Quantitative Extraction of Asphalt Binder from Asphalt Mixtures".

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1.04 SUBMITTALS

A. Asphalt Concrete: The Contractor, at his expense, shall submit for approval, a Job Mix formula (with accompanying curves) within the limits established by the reference specifications, for the mix designated by this Contract. The Contractor shall also submit a certification that all materials provided under this project comply with the Job Mix formula and the project specifications.

PART 2 – PRODUCTS

2.02 ASPHALT CONCRETE PAVEMENT

A. Asphalt Concrete shall meet the requirements of ADOT&PF Class 'A' with Type II Aggregate.

PART 3 - EXECUTION

3.01 TESTING

- A. Compaction tests shall be taken on at the average rate of one test per 5,000 square feet of area for both the Base Course and the Asphalt Pavement. Failing tests shall be retested at no additional cost to the Owner.
- B. Asphalt content and gradation tests shall be taken for the Asphalt Pavement at the average rate of one test per 5,000 square feet of area.

3.02 CONSTRUCTION STAKING

A. The Contractor shall provide construction staking (blue tops) for establishing proper grades on the leveling course on a nominal 50 ft grid plus all breaks in grade.

3.03 ASPHALT PAVEMENT

- A. Weather Limitations
 - 1. Asphalt concrete mixture shall not be placed when it is raining or when rain is imminent, on a saturated surface, on an unstable/yielding roadbed, when the base material is frozen, or when weather conditions prevent proper handling or finishing of the mixture.
 - 2. No mix shall be placed when water is puddled or standing on the surface of base course.
 - 3. Asphalt concrete mixture shall not be placed unless the surface temperature is forty-five degrees (45°) Fahrenheit or warmer and the ambient air is at least thirty-two degrees (32°) Fahrenheit and not descending. Air temperature shall be measured in the shade away from heat sources at the paving site. provided hot-mix asphalt shall be delivered continuously to the paver at temperatures between 250 and 325 degrees Fahrenheit.

- B. Preparation of Area to be Paved
 - 1. The area to be paved shall be true to line and grade, having a smooth dry, compacted surface prior to the start of paving operations. The area to be paved shall be free from all loose asphalt and foreign material.
 - 2. Contractor shall notify the Owner's Representative, a minimum of twenty-four (24) hours prior to paving, that the newly constructed, rotomill planed, or existing surface, has been prepared in conformance with the Drawings and Specifications and are ready to be paved. The Owner's Representative shall inspect the grade through the use of string line, straightedge, levels, or any other means necessary. Upon determining the grade that has been proposed for paving is in conformance with the Drawings and Specifications, Engineer will provide written authorization for the Contractor to proceed with the paving. The Contractor shall not initiate paving prior to receiving written authorization to proceed.
 - 3. The surface of the Leveling Course, when finished, shall not demonstrate any deviation in excess of three-eighths inch in ten feet (3/8" in 10') parallel with, and at right angles to, the centerline, or more than five-eighths inch (5/8") total from centerline to face of curb of the area to be paved. Any deviation in excess of this amount shall be corrected by loosening, adding, or removing material and reshaping and compacting to satisfy the above requirement.
 - 4. Existing paved surfaces shall be cleaned of loose material by sweeping with a power broom, supplemented by hand sweeping, if determined necessary by the Engineer.
 - 5. Contact surfaces of curbing, gutters, manholes, and other structures shall be painted with a thin, uniform coating of asphaltic cement or approved equal material prior to the mixture being placed against them. Butt joints on previously placed cooled pavement shall be saw cut and tack coated prior to continuing the paving operation.
 - 6. Contractor shall not pave against newly placed concrete curbing until said curbing has cured for a minimum seven (7) days. For the purpose of paving operations only, curb curing time may be reduced to seventy-two (72) hours only upon receipt of Contractor's written certification that Type III Portland High-Early-Strength cement concrete was used in, properly placed, and appropriate curing compounds were applied to the adjacent curb and gutter.
- C. Preparation of Paving Asphalt
 - 1. The asphalt shall be heated at the paving plant to a temperature at which it can be properly handled through the pumping system, but at no time shall the temperature of the asphalts exceed that recommended by the asphalt supplier or manufacturer, or be greater than three hundred twenty-five degrees (325°) Fahrenheit or less than two hundred fifty degrees (250°) Fahrenheit.

D. Hand Spreading

- On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the asphalt concrete mixture shall be spread, raked, and luted by hand tools. For such areas, the asphalt concrete mixture shall be placed to the required compacted thickness and density.
- E. Compaction
 - 1. Immediately after the asphalt mixture has been spread, struck off and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling.
 - 2. The surface shall be rolled when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving.
 - 3. Initial rolling shall be done with a steel-drum roller with the drive roll operating toward the paver, and/or a suitable pneumatic tired roller. Initial rolling shall be completed while the bituminous mat temperature is above two hundred twenty-five degrees (225°) Fahrenheit.
 - 4. Following the initial rolling at least three coverages of the pavement shall be completed with a pneumatic tired roller, while the mat temperature is above one hundred seventy-five degrees (175°) Fahrenheit.
 - 5. Final rolling shall be completed with a steel–drum roller and shall continue until roller marks and further compression are not evident in the pavement and specified density has been achieved.
 - 6. Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the road center line, each trip overlapping one-half the roller width, gradually progressing to the crown of the road. When paving in echelon or abutting a previously placed lane, the longitudinal joint should be rolled first followed by the regular rolling procedure. On superelevated curves the rolling shall begin at the low side and progress to the high side by overlapping of longitudinal trips parallel to the centerline.
 - 7. Any displacement occurring as result of the reversing of the direction of a roller, or from other causes, shall be corrected at once by the use of rakes and addition of fresh mixture when required. Care shall be exercised in rolling not to displace the line and grade of the edges of the asphalt mixture.
 - 8. To prevent adhesion of the mixture to the rollers, the wheels shall be kept properly moistened with water or water mixed with very small quantities of detergent or other approved material. Excess liquid will not be permitted.
 - 9. Along forms, curbs, headers, walls, and other places not accessible to the rollers, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons, or with mechanical tampers. On depressed areas, a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed area.

- 10. Rollers or other vehicles shall not be parked or left standing on pavement that has not cooled sufficiently to prevent indentation by wheels.
- 11. The Lower Specifications Limit for density is 92.0% of the Maximum Specific Gravity (MSG) as determined by ATM 409.

F. Joints

- Joints shall be constructed to ensure a continuous bond between old and new sections of the course. All joints shall present the same texture and smoothness as other sections of the course. The Contractor shall offset the longitudinal joints in the top layer from the joint in the layer immediately below by at least four inches (4").
- 2. When joining existing pavement and new pavement, the old pavement shall be cut in a neat line with a power driven saw.
- 3. Improperly formed joints resulting in surface irregularities shall be removed full depth, replaced with fresh asphalt concrete mixture, and thoroughly compacted. Rolling of joints after the material has cooled below one hundred seventy degrees (170°) Fahrenheit shall not be allowed. All pavement removal shall be precut to a neat line with a power-driven saw.
- 4. A tack coat of asphalt cement or asphalt emulsion shall be applied on all cold joints and allowed to break prior to placing fresh asphalt concrete mixture against the joint. This Work shall be completed by Contractor just prior to paving.
- 5. Transverse joints shall be formed by saw cutting back on the previous run to expose the full depth of the course or by using a removable bulkhead. Transverse joints shall not be perpendicular to centerline, but shall be skewed between fifteen and twenty-five degrees (15° and 25°).
- G. Repair and Replacement
 - 1. Asphalt concrete mixture that becomes contaminated with foreign material or is in any way defective as determined by the Engineer shall be removed. Skin patching will not be permitted. Defective materials shall be removed for the full thickness of the course. The pavement shall be cut so that all edges are vertical, the sides are parallel to the direction of traffic, and the ends are skewed between fifteen and twenty-five degrees (15° and 25°). Edges shall be coated with a thin tack coat of material. Fresh asphalt concrete mixture shall be placed in sufficient quantity so that the finished surface will conform to grade and smoothness requirements. The asphalt concrete mixture shall be corrected by full depth removal and replacement. No payment shall be made for material replacing defective material. All costs associated with the patching of defective areas shall be borne by Contractor.

H. Vehicular Traffic

1. Contractor shall not allow vehicular traffic on the asphalt mat surface until the mat surface has cooled to below one hundred twenty degrees (120°) Fahrenheit. Any portion of the asphalt concrete mixture that becomes loose and broken, rutted, or damaged in any way due to vehicular traffic on the asphalt mat surface prior to it cooling to below one hundred twenty degrees (120°) Fahrenheit, shall be removed and replaced with fresh hot asphalt concrete, which shall be compacted to conform with the surrounding area at the specified density.

END OF SECTION

SECTION 32 16 00

CURBS, GUTTERS, AND SIDEWALKS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, curbs and gutters, ramps.

1.02 RELATED SECTIONS

A. 033000 Cast in Place Concrete

1.03 QUALITY ASSURANCE

A. Provide materials in accordance with Section 033000.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Concrete Materials: As specified in Section 033000.
- B. Expansion Joints: Premolded joint filler for use in expansion joints shall conform to the requirements of ASTM D-1751 (AASHTO M-213).
- C. Reinforcing Steel: ASTM A615 (AASHTO M-31); It shall be free from loose scales, excessive rust, and coatings of any character which will reduce the bond between steel and concrete
- D. Welded Steel Wire Fabric: Cold-drawn steel wires or galvanized fabricated into mesh formed by the process of electric welding. The grade of wire shall conform to AASHTO M-32. Welded Steel Wire Fabric shall conform to ASTM A-185 (AASHTO M-55).
- E. Dowels: Plain steel, uncoated finish.
- F. Curing Compound: Spray on type, MB-429, manufactured by Masterbuilders.
- G. Joint Sealant: Asphaltic, pour applied type.

PART 3 - EXECUTION

3.01 FORMING

- A. Curb and Gutter
 - 1. Forms may be of wood or metal or any other material at the option of the Contractor, provided that the forms as set will result in a curb, or curb and gutter of the specified thickness, cross section, grade and alignment shown on the Drawings.

- 2. Forms may be removed on the day following pour if the concrete is sufficiently set that removal can be accomplished without danger of chipping or spalling. Form materials shall be free from warp, with smooth and straight upper edges, and if used for the face of a curb, shall be surfaced on the side against which the concrete is to be placed. Wooden forms for straight work shall have a net thickness of at least one and one-half inches (1.5"). Metal forms for such a work shall be of a gage that will provide equivalent rigidity and strength. Curb face forms used on monolithic curb and gutter construction shall be a single plank width when the curb face is ten inches (10") or less, except for those used in curb returns. All forms used in curb returns shall not be less than threeguarters inches (3/4") in thickness, cut in the length and radius as shown on the Drawings, and held rigidly in place to line and grade by the use of metal stakes and clamps. The curb face form shall be cut to conform exactly with the curb face batter as well as being cut to the required length and radius. Forms shall be of sufficient rigidity and strength, and shall be supported to adequately resist springing or deflection from placing and tamping of concrete.
- 3. Form material shall be clean and free from defect at the time of use.
- 4. All forms including back planks of curb shall be set with upper edges flush with specified alignment and grade of the finished surface of the improvements to be constructed, and all forms shall be not less than a depth equivalent to full specified thickness of the concrete to be placed.
- 5. Forms shall be held securely in place by means of metal stakes driven in pairs at intervals not to exceed three feet (3'), one at the front form and one at the back form. Clamps, spreaders, and braces shall be used to the extent as may be necessary to insure proper form rigidity. Forms for walk and similar work shall be firmly secured by means of stakes driven at intervals not to exceed four feet (4'). Form stakes shall be of sufficient size and be driven so as to adequately resist lateral displacement.
- 6. Commercial form clamps for curb and gutter may be used provided they fulfill the requirements specified herein.
- 7. Pump trucks may be used upon approval of the Owner's Representative. Prior to approval, the Contractor must demonstrate to the satisfaction of the Owner's Representative that the pumping equipment will not segregate, or in any other way degrade, the concrete. Additional test samples for such alternate placement methods may be taken from the discharge side of the machine for compressive strength determination assurance tests.
- 8. All forms shall be set to the lines, grade, and dimensions shown on the Drawings. The forms shall be thoroughly braced and secured to resist deformation or displacement under load, and shall be installed to permit easy removal without hammering or prying against the fresh concrete. The top of the forms shall not deviate more than one-eighth inch (1/8") in ten feet (10'), and the alignment of forms shall be within one-fourth inch (1/4") in ten feet (10').

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9. Before placement of concrete, steel forms shall be lightly oiled with a good grade of form oil. Excess oil shall be removed by wiping with clean rags, dampened in diesel or fuel oil. Wooden forms may be oiled in the same manner as metal forms, or they may be watered immediately in advance of the placement of concrete. Watering of the form shall be done with clean water of the same quality as that specified for mixing water, and only when the atmospheric temperature is not less than forty degrees (40°) Fahrenheit. Concrete shall not be placed until all forms have been inspected and approved by the Owner's Representative. Wherever form work is exposed to pedestrian traffic, bridges (not attached to the forms) shall be provided at all regular pedestrian crossings where it is required to maintain safety standards. Barricades and other safety features shall be installed as necessary.

B. Sidewalk

- Forms shall conform to requirements outlined in Section 321600.3.01.A. Wood forms against unexposed concrete surfaces shall be No. 2 Common Lumber or better. Those against surfaces to be exposed shall be dressed and matched boards of uniform thickness, and widths not exceeding ten inches (10"). Rigid, nonporous and waterproof sheet material may be used provided the end result will be a smooth unmarked concrete surface without waves, fins or other noticeable markings.
- 2. Plywood conforming to the requirements for form work, as set forth by the American Plywood Association, may be used against both exposed and unexposed concrete surfaces. This plywood shall be not less than five (5) ply and at least nine-sixteenths inch (9/16") thick. Low areas in the subgrade shall be backfilled with classified fill or with suitable native material as directed by the Owner's Representative. The backfill shall then be compacted to ninety-five percent (95%) maximum density and any dry areas in the subgrade shall be thoroughly dampened prior to the time the concrete is placed. No payment will be made for water, and the work of placing and cost thereof shall be considered as incidental to the construction of the concrete sidewalk.

C. Curb Ramp

1. Forms shall conform to requirements outlined in Section 321600.3.01.B.

3.02 REINFORCEMENT

- A. Place reinforcement at mid-height of slabs-on-grade.
- B. Interrupt reinforcement at expansion joints.

3.03 PLACING CONCRETE

- A. Curb and Gutter
 - Prior to the delivery of the first load of concrete for curbs, the Contractor shall furnish rigid straightedges, ten feet (10') or sixteen feet (16') in length, to the Owner's Representative for checking surface uniformity. String shall not be used as a straightedge. Surface irregularities, as measured along the top face of curb and the curb pan, shall not exceed three-sixteenth inch (3/16") within ten feet (10'), or five-

sixteenth inch (5/16") within sixteen feet (16'). Non-conforming surfaces shall be subject to rejection by the Owner's Representative. All surfaces rejected by the Owner's Representative shall be corrected by the Contractor at the Contractor's expense.

- 2. The subgrade shall be properly compacted and brought to specified grade in accordance with the Drawings before placing concrete. The subgrade shall be thoroughly dampened immediately prior to the placement of the concrete. Forms shall not be splashed with concrete in advance of placing.
- 3. Concrete shall be discharged from transport vehicle to the point of final placement in a continuous manner as rapidly as practicable. The rate of placement shall not exceed the rate at which the various placing and finishing operations can be performed in accordance with these Specifications. Concrete shall not be allowed to free fall more than three feet (3').
- 4. If concrete is to be placed by the extruded method, the Contractor shall demonstrate to the satisfaction of the Owner's Representative that the machine is capable of placing a dense, uniformly compacted concrete to exact section, line and grade. Extruded curb which does not meet all requirements of the Contract Documents, shall be replaced at the Contractor's expense.
- 5. Expansion joints shall be placed along all structures, as shown in the Drawings and/or Standard Details, and around all features that project into, through, or against the concrete. An expansion joint shall be constructed at the intersection of sidewalks; between sidewalk crossings and sidewalks; between curbs and sidewalks (except parallel curb); and at the beginning and end of curb returns. Additionally expansion joints shall be constructed every fifty feet (50') where the sidewalk span exceeds seventy-five feet (75') and expansion joints are not required for the above listed reasons. Expansion joint material shall conform to the requirements of ASTM D-1751 (AASHTO M-213). Expansion joints shall not exceed one half inch plus or minus oneeighth inch (1/2"±1/8") in width. Expansion joint material shall extend the full width of the structure and shall be cut to such dimensions that the base of the expansion joint shall extend to the subgrade and the top shall be depressed not less than one-quarter inch (1/4") nor more than one-half inch (1/2") below the finished surface of the concrete. The material shall be of one (1) piece in the vertical dimension and shall be securely fastened in a vertical position to the existing concrete face against which fresh concrete is to be placed. After the concrete has set, the expansion joints shall be filled flush to the finish concrete surface with an approved polyurethane sealant applied according to the manufacturer's recommendation. Before sealing, the joint shall be cleaned of all dirt, gravel, concrete mortar, and other extraneous material. Sealing shall be done in a neat workmanlike manner.
- 6. Transverse contraction joints, cut to a depth of one inch (1") prior to the final set of the concrete, shall be tooled in the sidewalks at intervals of five feet (5'), and at ten feet (10') intervals in the curb and gutter. Where the sidewalk adjoins the curb (parallel to it), contraction joints in the sidewalk and curb shall be made to match where practicable.

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- B. Sidewalk
 - 1. The concrete shall be spread uniformly between the forms and thoroughly compacted with a steel shod strikeboard. After the concrete has been thoroughly compacted and leveled, it shall be floated with wood floats and finished at the proper time with a steel float. Joints shall be edged with a one-quarter inch (1/4") radius edger and the sidewalk edges shall be tooled with a one-half inch (1/2") radius edger. After final troweling, sidewalk on grades of less than six percent (6%) shall be given a fine hair broom finish applied transversely to the centerline. On grades exceeding six percent (6%), walk shall be finished by hand with a wood float. Walk shall be re-marked as necessary after final finish to assure neat uniform edges, joints, and score lines. Unsightly, poorly finished, and sidewalk failing to meet the requirements of the Drawings, Specifications, and this Section will be rejected.
 - 2. The sidewalk shall be divided into panels by scoring one inch (1") deep every five feet (5'). Refer to Sections 321600.3.03.A.5 and 321600.3.03.A.6 for requirements for contraction and expansion joints. The expansion joints shall be placed at all structures such as catch basins and manholes, at driveways, and at all points of tangency and points of curvature. Additional requirements for placing and finishing concrete in cold weather shall be as outlined in Weather Limitations.
 - 3. For all other exposed aggregate concrete sidewalks, Contractor shall float and trowel all surfaces to receive the exposed aggregate finish. Seeding the surface with aggregate shall not be allowed. After the concrete has taken its initial set, the surface aggregate shall be exposed using a water fog spray and brooms to remove the surface matrix. The coarse surface aggregate shall be exposed very lightly, approximately one-sixteenth inch (1/16"). After the concrete has taken its final set, a weak acid wash shall be applied to clean and wash the exposed aggregate surfaces. The weak acid wash shall be thoroughly neutralized and flushed from the finished surface. Under no circumstances shall Contractor allow the acid wash to enter the storm drain lines.
 - 4. Contractor shall protect adjacent construction, plantings, finishings, structures, and the public from damage and harm due to the acid wash. The finished appearance of the exposed aggregate concrete sidewalk shall produce an appearance and texture that matches the adjacent exposed aggregate sidewalk. Any significant difference in texture or appearance between two adjacent concrete panels, as determined by the Owner's Representative, shall result in removal and replacement of concrete panels by Contractor at no additional cost.
 - 5. Contractor shall provide a two foot by two foot (2' x 2') exposed aggregate concrete test panel prior to constructing the exposed aggregate concrete sidewalk. Location of the test panel will be on-site as approved by the Owner's Representative. Notification of providing this test panel shall be made to the Owner's Representative no less than 24 hours prior to making the test panels to allow the Owner's Representative and materials analysis personnel to be present. The Owner's Representative may require the

Contractor to provide additional panel(s) if the test panel does not produce an appearance that matches the adjacent exposed aggregate sidewalk.

- 6. Providing the test panel and any other required test panel shall be considered incidental to the construction of sidewalk and no separate payment shall be made.
- C. Curb Ramps
 - 1. Placing Concrete shall conform to requirements outlined in Section 321600.3.03.B.
 - The ramps shall comply with the Americans with Disabilities Act Title II as identified in 28 CFR Part 35 – Nondiscrimination on the Basis of Disability in State and Local Government Services.
 - 3. The Contractor shall construct each curb ramp and install the detectable warning panel(s) in conformance with the Contract Documents and the manufacturer's recommendations.
 - 4. No later than five (5) days prior to construction of the curb ramps, Contractor shall submit to the Engineer for review and approval, a layout drawing for each curb ramp to resolve issues related to pattern repeat, tile cuts, expansion joints, control joints, ramp curves, ramp end returns and surface interfaces, and truncated dome spacing.
 - 5. In accordance with the Americans with Disabilities Act Public Rights-of-Way Accessibility Guidelines (PROWAG), dimension not stated as "maximum" or "minimum" are absolute. All dimensions are subject to conventional industry tolerances, except where the requirement is stated as a range with specific minimum and maximum end points.
 - 6. Conventional industry tolerances recognized by the American with Disabilities Act Accessibility Guidelines (ADAAG) include those for field conditions that may be a necessary consequence of a particular manufacturing process. Information on specific tolerances may be available from industry or trade organizations, code groups, building officials, and published references. (Example: American Concrete Institute Standard Specifications for tolerances for concrete construction and materials (ACI-117).

3.04 STRIPPING FORMS AND FINISHING

- A. Curb and Gutter
 - 1. The face form of the curb shall be stripped at such time in the early curing as will enable inspection and correction of all irregularities that appear thereon.
 - 2. Forms shall not be removed until the concrete has set sufficiently to retain its true shape. The face of the curb shall be troweled with a tool cut to the exact section of the curb and at the same time maintain the shape, grade, and alignment of the curb. Both front and back edges shall be troweled to a radius of one-half inch (1/2"). Final finish shall be obtained by brooming the surface, including the troweled edge to a gritty finish after all free moisture has disappeared from the surface. Sprinkling of cement or sand for blotting will not be permitted.

- 3. It is the intent of this Specification to ensure the highest quality of workmanship in the construction and finishing of P.C.C. curb and gutter.
- 4. Unsightly or poorly finished surfaces will be considered grounds for rejection of the Work. The top and/or face and gutter of the finished concrete surfaces shall be true and straight, of uniform width and free of cracks, humps, sags, or other irregularities. The finished concrete surface shall not vary more than two hundredths of a foot (0.02') from a ten foot (10') straight edge, except at grade changes or curves. No freestanding water is permitted on slopes at or greater than one percent (1%). No freestanding water deeper than one-sixteenth inch (1/16") is permitted on slopes of less than one percent (1%). The Contractor shall flow test all new concrete curb and gutter. Curb and gutter failing to meet this requirement will be rejected.
- 5. All defective areas shall be removed and replaced at the Contractor's expense, unless permission to patch is granted by the Owner's Representative. Such permission shall not be construed as an acceptance of the Work or as a waiver of the Owner's Representative's right to require the complete removal of the Work, if in his opinion the patch does not satisfactorily restore the quality or appearance of the surface.
- 6. Should patching be permitted, the area shall be chipped clean to a depth of one inch (1") perpendicular to the surface and saturated with clean water prior to being patched. The patch shall be made with a mortar extracted from fresh concrete by passing it through a three-eighths inch (3/8") screen. The mortar shall be thoroughly compacted and screeded off slightly higher than the surrounding surface to allow for contracting or setting after the maximum shrinkage has taken place. After one (1) to two (2) hours, the patch shall be troweled to the same finish as the surrounding area and shall be cured as specified herein. The use of special patching material will be permitted if approved by the Owner's Representative.

B. Sidewalk

1. Stripping Forms and Finishing shall conform to requirements outlined in Section 321600.3.04.A.

C. Curb Ramp

1. Stripping Forms and Finishing shall conform to requirements outlined in Section 321600.3.04.A.

3.05 CURING

- A. Curb and Gutter
 - Curing compounds shall be applied to all exposed surfaces immediately after finishing. Transparent curing compounds shall contain a color dye of sufficient strength to render the film distinctly visible on the concrete for a minimum period of four (4) hours after application.
 - 2. If, at any time during the curing period any of the forms are removed, a coat of curing compound shall be applied immediately to the exposed surface. The curing compound

shall be applied in sufficient quantity to obscure the natural color of the concrete. Additional coats shall be applied if the Owner's Representative determines that the coverage is not adequate. The concrete shall be cured for the minimum period of time set forth below.

- 3. Curb and gutter constructed of Type I/II Portland Cement Concrete must have been placed and finished a minimum of seven (7) days prior to material being distributed against, or vibrated (compaction) adjacent to the structure.
- 4. Curb and gutter constructed of Type III Portland Cement Concrete must have been placed and finished a minimum of three (3) days prior to any material being distributed against, or vibrated (compaction) adjacent to the structure.
- 5. When forms are removed before the expiration of the curing period, the edges of the concrete shall be protected with moist earth, or sprayed with curing compound.
- 6. Other standard methods of curing the curb and gutter may be used upon approval of the Owner's Representative. Concrete shall not be placed unless curing compounds and necessary equipment for applying such is on the Project site.
- B. Sidewalk
 - 1. The materials and procedures outlined in Section 321600.3.05.A shall prevail. The curing agent shall be applied immediately after finishing and be maintained for a period of seven (7) days. The curing agent(s) and/or concrete mixtures shall in no way deter or prevent final finishing of concrete. The use of surface retarders may be permitted if application methods are accepted by the Owner's Representative, in writing, no less than twenty-four (24) hours prior to concrete placement.
 - 2. The Contractor shall have readily available sufficient protective covering, such as waterproof paper or plastic membrane, to cover the pour of an entire day in event of rain or other unsuitable weather.
 - 3. The sidewalk shall be protected against damage or defacement of any kind until it has been accepted by the Owner. Sidewalk which is not acceptable to the Owner's Representative because of damage or defacement shall be removed and replaced at the expense of the Contractor.
 - 4. Additional requirements for curing in cold weather shall be as outlined in Weather Limitations.
- C. Curb Ramp
 - 1. Curing shall conform to requirements outlined in Section 321600.3.05.B.

3.06 WEATHER LIMITATIONS

A. Comply with weather limitations specified in Section 033000.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 GENERAL

- 1.01 DESCRIPTION
 - A. This Work shall consist of furnishing all materials and placing painted pavement markings. All work shall be in accordance with these specifications and shall be placed at the locations shown on the plans.

PART 2 PRODUCTS

2.01 PAINT FOR PAVEMENT MARKINGS

- A. The Contractor shall furnish the name of the company that will manufacture the paint and the location of the plant from where shipments will be made. No material shall be shipped by the manufacturer until it has been sampled, tested, and approved.
- B. Traffic Lane Paint shall conform to AASHTO M248, Type III F.

PART 3 EXECUTION

3.01 GENERAL

- A. Sequencing of Work.
 - 1. This work shall be done as soon as possible after paving is completed to facilitate placement on clean pavement.
- B. Paint Color.
 - 1. All pavement markings shall conform to the colors shown on the plans.
- C. Preparation of Surface
 - 1. Paint shall not be applied to pavements which are excessively dirty, damp, or cold. Paint shall not be applied when the pavement temperature is less than 40 degrees F.
 - 2. All dirt, oil, grease, and other foreign matter shall be removed from the areas of the pavement upon which the traffic markings are to be painted by an approved method.

- D. Types of Markings.
 - 1. The type and color of the markings shall be as shown on the plans.
- E. Width of Lines
 - 1. The width and spacing of all lines shall be shown on the plans.
- F. Application
 - 1. The paint shall be applied with atomizing spray type striping machine, approved by the Engineer. The markings shall have clear-cut edges, true and smooth alignment and uniform film thickness. The wet film thickness shall be 17 mils with a nominal variation not to exceed 2 mils.
- G. Preliminary Spotting
 - The Contractor shall provide the necessary control points at intervals including all changes of direction and changes in the basic configuration of striping The Contractor shall be responsible for preliminary spotting of the lines to be painted and he must obtain approval for all his spotting before striping may begin.
- H. Tolerances
 - 1. The Contractor shall keep his work within the following allowable tolerances:
 - 2. Length of stripe. The longitudinal error within a 20-foot length shall not be more than plus or minus 1 inch.
 - 3. Width of stripe. The width of stripe shall not vary more than plus or minus 1/4 inch.
- I. Cleanup
 - 1. Contractor shall clean up and remove all overspray.

END OF SECTION

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SECTION 33 21 00

WATER SUPPLY WELLS

PART 1 - GENERAL

- 1.01 DESCRIPTION
 - A. The work to be performed under these specifications consists of furnishing all labor, materials and equipment necessary for drilling, casing and grouting, screening, developing and testing one 6" water well for domestic drinking water use and one 6" water well for fire water as shown on the plans or as staked in the field. It is understood that the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities whatsoever necessary to execute, complete and deliver the work within the specified time.

1.02 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. Groundwater and Wells, 3rd edition, Robert J. Sterrett, ed., Third Edition, Johnson Screens, a Weatherford Company, New Brighton, Minnesota.
- C. 18 AAC 80 Drinking Water, Alaska Department of Environmental Conservation, amended as of November 7, 2017.
- D. ANSI/AWWA Standard A100-06, Water Wells.
- E. ANSI/AWWA Standard E102-06, Standard for Submersible Vertical Turbine Pumps.

1.03 SYSTEM DESCRIPTION

- A. **One 6" domestic water well** will be installed at the location noted on the project plans. Location may be modified in the field as dictated by actual site conditions after consultation with the Engineer. The well shall be drilled to an approximately depth of 100 ft to 150 ft below existing grade as required to meet minimum flow rates and drinking water quality standards. Site conditions will determine the final drilled depth as determined by the drilling contractor. The well shall be constructed in accordance with the requirements of the Alaska Department of Environmental Conservation (ADEC) as applicable to private water supply wells.
- B. **One 6" fire water well** will be installed at the location noted on the project plans. Location may be modified in the field as dictated by actual site conditions after consultation with the Engineer. The well shall be drilled to an approximately depth of 100 ft to 150 ft below existing grade as required to meet minimum flow rates and water quality standards. Site conditions will determine the final drilled depth as determined by the drilling contractor. The well shall be constructed in accordance with the requirements of the Alaska Department of Environmental Conservation (ADEC) as applicable to private water supply wells.

1.04 SUBMITTALS

A. Drawings – Site Plan and Aerial Photo Submit drawings or catalog cuts showing well components and details of well casings,
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well screens, well head, pitless adaptor and type of grout. Detail drawings or catalog cuts shall be accompanied by a cross section showing the relative size, location, and spacing of the well components such as the hole size, outer casing, well screen, airline and gauge, and grout.

B. Well Logs

The specifications include well logs of one well approximately 150 feet to the southeast from this site. It is implicit in this section of the specifications and mutually understood that the information contained in the specifications and suggested sources of information is not necessarily complete in total or detail, and that such conclusions the Contractor may draw from these and other sources are his own, and that this specification is included for the specific purpose of providing the Contractor with an aid to the development of his investigation of the site conditions.

- C. Statements
 - 1. Water Disposal Methods
 - 2. Gravel Placement Equipment List (if required)
 - 3. Gravel Placement Methods (if required)
- D. Certificates of Compliance
 - 1. Casing
 - 2. Cement
 - 3. Drilling Mud
 - 4. Screens
 - 5. Gravel
- E. File Reports
 - 1. Pump Test
 - 2. Water Analysis
 - 3. Plumbness and Alignment Test
- 1.05 GENERAL REQUIREMENTS
 - A. The construction required for this work shall include appurtenant structures and services, and coordination with other suppliers, as described herein. The Contractor shall replace damaged material and redo unacceptable work at no additional cost.
 - B. Contractor shall be responsible for obtaining utility locates prior to performing underground work.
- 1.06 INSTALLER QUALIFICATIONS
 - A. Installation and construction shall be performed by a contractor licensed for such work in Alaska. Contractor's License(s) shall be current. Contractor shall submit a list of three previous projects of similar size and type for municipal clients. The list shall include the owner's name and address, phone number, casing diameter, depth, and water production capacity. The Contractor shall employ only competent workers for the execution of the work and all such work shall be performed under the direct supervision of an experienced well driller to the satisfaction of the Engineer.
- 1.07 DELIVERY, STORAGE, AND PROTECTION
 - A. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Do not store

materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris. Replace defective or damaged materials with new materials.

- B. Metal Items: Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials. Replace defective or damaged materials with new materials.
- C. Well Pump: Inspect materials delivered to site for damage; store with minimum of handling. Store pump in climate controlled warehouse or enclosure and protect from adverse weather conditions. Do not store directly on the ground. Replace defective or damaged materials with new materials.
- 1.08 TOOLS, PLANT AND EQUIPMENT
 - A. If, at any time before the commencement or during the progress of the work, tools, plant, or equipment appear to the Owner's Rep. to be insufficient, inefficient, or inappropriate to secure the quality of the work required or the proper rate of progress, the Owner's Rep. may order the Contractor to increase their efficiency, to improve their character, to augment their number, or to substitute new tools, plant, or equipment as the case may be, and the Contractor must conform to such order; but the failure of the Owner's Rep. to demand such increases of efficiency, number, or improvement shall not relieve the Contractor of his obligation to secure the quality of work and the rate of progress necessary to complete the work within the time required by the Contract to the satisfaction of the Owner.

PART 2 – PRODUCTS

- 2.01 WELL CASING AND GROUTING
 - A. Blank steel well casing shall be made of new mild or low-carbon steel, with beveled ends. Well casing shall be a minimum of 6-inch inside diameter. Casing wall thickness shall be a minimum of 0.25 inches (1/4").
 - B. Use grout consisting of 1 part Portland cement in accordance with ASTM C150 and 3 parts sand mixed with only enough water to form a workable mix. Use of bentonite or other additives to reduce shrinkage, reduce permeability, increase fluidity or control setting time must be approved by the Engineer.
- 2.02 JOINTS
 - A. Well casing joints shall be Welded water tight and structurally sound, in accordance with ANSI/AWWA C206, Standard for Field Welding of Steel Water Pipe, latest edition.
- 2.03 WELL SCREENS
 - A. Type 304 or 316 stainless steel, inside diameter, spiral round, wedge-wire type. Provide screens with adequate strength to resist external forces, both during and after installation. Length shall be 2 ft. less than thickness of water producing formation or of adequate length to provide required well capacity. Water velocity through openings shall not exceed 0.1 foot per second. Determine the well screen openings from an analysis of the sand in the water-bearing strata. Provide joints of the same material as the screen, with either threaded rings or butt-type welding rings.

2.03 FILTER GRAVEL

A. If filter gravel is required, provide clean, round, hard, water-worn quartz or granite with less than 5 percent feldspar, no fossils, carbonate, or organics, and of proper size and gradation to allow free flow of water in the well and prevent the infiltration of sand. Gravel size will be selected by the Owner's Rep., based upon the analysis of the sand in the water-bearing strata. Sterilize gravel with 20 ppm of free available chlorine for a minimum of 2 hours before using.

2.04 AUXILIARY EQUIPMENT

A. Provide discharge piping to dispose of pumped water during developing and testing of well. Locate the discharge piping a sufficient distance from each well to prevent flooding of the site and flow back into the well, as approved by the Owner's Rep.

2.05 MATERIALS IN CONTACT WITH DOMESTIC WATER

A. All domestic water line materials and appurtenances shall be NSF-61 approved and shall be lead free as required by Alaska Administrative Code 18 AAC 80.500.

PART 3 – EXECUTION

- 3.01 WELL CONSTRUCTION
 - A. The depth of the **6**" **domestic well** and number of screens provided shall be adequate to produce a guaranteed capacity of <u>30 gallons per minute of water suitable for</u> <u>domestic use.</u> Approved methods of construction include air rotary with drill through casing hammer using drilling mud for conventional fluid rotary drilling or reverse circulation drilling.
 - B. The depth of the **6**" **fire water well** and number of screens provided shall be adequate to produce a guaranteed capacity of <u>150 gallons per minute of water suitable for fire fighting</u>. Approved methods of construction include air rotary with drill through casing hammer using drilling mud for conventional fluid rotary drilling or reverse circulation drilling.

3.02 DRILLING

A. Access to the well shall be the responsibility of the Contractor. Conditions may require tree/ brush removal to gain access to the site. Consult Plan/Photo for location and condition. Drill a hole adequate for casing, 6 inches in diameter to a minimum depth of 100 feet with possible maximum depth of 150 feet as required to produce the flow capacity required.

Accurate logging of the well shall be performed as it is being drilled. A continuous log of water level and/or production shall be maintained at all times and correlated with depth and strata encountered. Casing shall be driven to within 5 feet of the bottom of the hole at all times during drilling to ensure that the inflow into the well as measured by metering or observation of water level changes shall be representative of the production of the aquifer through which the well is being drilled.

3.03 CASING

A. The Contractor shall furnish and install new steel casing, conforming to the

requirements of the latest American Water Works Association Specifications for pipe. Install the casing in the drilled hole and extend the casing to the required depth to produce maximum water flow.

Provide welded joints in accordance with AWWA C206. Install well screens concentrically in the casing and drill hole. The casing shall be cut off square and smooth at the height above existing grade, (estimated at 3 feet) or as directed by the Owner's Rep. and shall be temporarily capped by tack-welding a 1/4-inch thick steel plate over the top. Grout casing to meet current ADEC requirements, (AAC 80.015 Source Protection). Grout casing is to have 10" casing placed and lower 12 feet of the 20 foot depth grouted over full circumference. Provide sufficient screens at the water-bearing layer to be developed to secure available flow. Seal the bottom of the deepest screen with a threaded or welded plug, consisting of the same material and thickness as the screen body, or a welded plate, consisting of the same material and thickness as the screen body or casing. The **use of lead packing** will not be acceptable.

The well shall be constructed and all casing and liners set round, plumb, and true to line. The well shall not vary from the vertical in excess of two thirds the inside diameter of the part of the well being tested per 100 ft. of depth and any such deviation shall be continuous and in one direction, with no more than 1/3 turn of spiral in the entire depth of the well.

The Contractor shall provide necessary equipment and materials to adequately test the well for plumbness and alignment. Testing for plumbness and alignment shall be in accordance with AWWA Specification A100. The depth to which testing for plumbness and alignment shall be performed will be to the lowest anticipated pump setting as determined by well testing during the progress of the contract.

The Contractor at his own expense shall correct the plumbness and alignment of the well, and should he fail to correct such faulty alignment or plumbness, the Owner's Rep. may refuse to accept the well.

3.04 WASTE DISPOSAL

A. Dispose of waste materials and soil removed from the drilled holes by deposition on Owner's property, as directed by Owner's Rep.

3.05 FIELD SAMPLING AND TESTING

- A. Material Samples
 - 1. During drilling, take samples of materials found in each significant, water bearing soil stratum. Label samples to show depth below ground surface and thickness of the stratum from which the samples were obtained. Describe water-bearing strata in detail as to whether material is loose or compact, the color of material, and if gravel, whether it is water worn or angular. The presence and extent of clay must be noted.
- B. Samples and Records
 - 1. The Contractor shall carefully save a representative sample (at least 30 pounds) of the material taken from the principle water bearing strata. A waterproof label designating the exact top and bottom depth at which the sample was taken, and a description of the material shall be attached to the

sample bag. All samples shall be properly marked and kept at the well site for delivery to the Owner's Rep.

- C. Water Quality Determination
 - 1. Owner will perform all water quality testing as dictated by ADEC for potable water sources.
- D. Protection of Quality of Water
 - 1. The Contractor shall take such precautions as are necessary or as may be required to permanently prevent contaminated water, or water having undesirable physical or chemical characteristics, from entering through the opening made in drilling the well or the stratum from which the well is to draw its supply. He shall also take all necessary precautions during the construction period to prevent contaminated water, gasoline, etc., from entering the well either through the opening or by seepage through the ground surface. In the event the well becomes contaminated, or water having undesirable physical or chemical characteristics enters the well, due to the neglect of the Contractor, he shall, at his own expense, perform such work or supply such casing, seals, sterilizing agents, or other material as may be necessary to eliminate the contamination.
- E. Well Screens
 - During the testing work, the Contractor may be required to furnish and install 1. wire-wound well screens and develop and pump test the wells in order to obtain accurate measurements of the potential productivity of the aquifer(s). Samples obtained by bailing, of the aquifer to be screened shall be are to be performed for gradation analysis and selection of screen-size opening, by the well drilling Contractor. The Owner's Rep. will be furnished the results of the analysis and a recommendation for screen-size openings and lengths. The size of the opening will be determined in accordance with the effective size and uniformity co-efficient of the soils found in the water-bearing strata. The Contractor shall furnish and install wire-wound well screens with the rod and wire welded at each intersection; similar to Johnson "EVERDUR," manufactured by Edward E. Johnson, Inc., St. Paul, Minnesota. The Contractor shall schedule his work so that the minimum amount of delay will be experienced in ordering and obtaining well screens. No additional payment will be made because of delays or standby time in ordering or producing well screens. The screens shall be set by withdrawing the casing and sealing the top of the screen to the bottom of the casing with an approved lead packer designed and recommended by the manufacturer of the screen.
- F. Well Development
 - 1. The water-bearing horizon around the screens shall be thoroughly surged and developed. A close fitting surge block and a suitable weight of tools may be used for developing. The Contractor shall exercise extreme care in the performance of the development work in order to prevent the breakdown or caving-in of strata overlying that from which the water is drawn. The screens must have no change of alignment at any of their points after installation. The

Contractor shall develop the well until the water pumped from the well is essentially free from sand. Since it is impossible to predict the number of hours that may be required to properly develop the well, the number of hours given in the Unit Price Schedule is an estimate only and the actual number will be determined by the results as development proceeds. Upon completion of development and sand extraction work, the well shall be tested in accordance with the requirements of these specifications. Notify Owner of anticipated time to start development.

Provide well development in accordance with Article 52 of EPA 570/9-75-001, except explosives will not be permitted. Furnish pumps, compressors, plungers, bailers, and other equipment required to fully develop the well for the maximum yield of water per foot of drawdown and to limit sand intrusion during the life of the well.

- G. Pump Test
 - 1. Upon completion of permanent well, provide a temporary pump in the well for measuring the flow. Drawdown is to also be determined during the pump down process. Determine capacity and drawdown through a method previously coordinated with Owner. After determining the safe maximum yield of the well, conduct a continuous 4-hour pump test at that rate and check the drawdown at hourly intervals. Furnish a complete written log of the pump test, showing static water level, pumping rate, and drawdown at the specified intervals.
- H. Disinfection
 - 1. After completing installation of the permanent pump assembly, disinfect the well by adding chlorine or hypochlorite in sufficient quantity so that a concentration of at least 50 ppm of chlorine is obtained in all parts of the well. Chlorine solution shall be prepared and introduced into the well in an approved manner and shall remain in the well for a period of between 12 and 24 hours. Information on methods for preparing chlorine solution and introducing it into the well may be found in AWWA C654. All highly chlorinated water shall be adequately dechlorinated prior to disposal.
 - 2. After chlorine contact period, well shall be pumped until residual chlorine content is not greater than 1.0 ppm. Well shall be pumped to waste for an additional 15 minutes with less than 1 ppm chlorine residual after which two samples shall be taken not less than 30 minutes apart and tested for the presence of coliform bacteria. Obtain sample bottles from an ADEC approved testing laboratory. Collect water samples and submit them to the laboratory for testing. If the sample does not meet public health requirements, disinfect again and re-sample until satisfactory results are obtained.
- I. Sanitary Seal
 - 1. Provide and install a fully enclosed permanent, sanitary seal, incorporating a sealed conductor entry point, for the well to prevent contamination.

3.06 PROTECTION AND CLEAN UP OF SITE

A. The Contractor shall protect all drainage ditches, structures, embankments, or other property during the progress of his work. Cuttings, drillings, or other debris shall not be

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washed into drainage structures that might cause clogging of drainage in any way. Upon completion of the well and any test that may be required, the Contractor shall remove by bailing, sand pumping, or any other approved method any sand, stone, or foreign material that may become deposited in the well, and shall leave the surrounding area clear and ready for installation of permanent pumping equipment and appurtenant structures.

3.05 WELL PUMPS AND PIPING INSTALLATION

A. General

1. Standard Products

The equipment to be furnished under this specification shall be essentially the standard product of the manufacturers. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer. However, the component parts of the system need not be the products of the same manufacturer. The bidder shall furnish a statement giving a complete description of all points where the equipment he proposes to furnish does not comply with the specifications as well as any exceptions he may make to the specification. Failure to furnish such a statement will be interpreted to mean that the bidder agrees to meet all requirements of the specifications.

- 2. Spare Parts Data Spare parts data for the pumps shall be furnished.
- B. Operation and Maintenance Manual
 - 1. The Contractor shall provide an installation, operation and maintenance manual for the pumping equipment. The manuals shall be bound and assembled.
- C. Shop Drawing Materials
 - 1. The following shop drawing materials shall be submitted:
 - a. Catalog cuts, brochures and descriptive data for pumps
 - b. Certificates: Pump curves for the pump to be furnished certified by the manufacturer.
- D. Submersible Pumps

The permanent NSF-61 certified pump is to be selected, furnished and installed by the Contractor after the well tests have been completed and submitted pump is approved by the Owner. Substantial completion refers to the well placement and finish with full realization that the pump will require sizing and expedition time. The Owner's consultant will determine the needed capacity for the facility, which will then allow the pump to be sized. In order to establish a bidding price for purposes of awarding the contract, the Contractor will base his bid on the following description. If the pump finally selected varies in size, type and capacity from the described equipment, a price adjustment will be made based on the manufacturer's published prices for both pumps. The pump shall be suitable for installation in the six-inch (6") well casing and for pumping against a total head of approximately <u>250 feet at 30 gpm (domestic) and 150 gpm (fire water).</u>

The pump shall have a strainer inlet and power cable. The selected pump shall allow an

operation point at mid point on its respective pump curve. All parts in contact with the water shall be free of copper, zinc, lead, tin, and cadmium, either as an alloy constituent or plating. Primary wear elements are to be stainless steel.

Pump shall be equipped with a positive acting foot valve to assure that water cannot flow from the line back down through the well. Combination magnetic starters for the pump shall be included in the control unit as required by the plans.

The pumps shall be equipped with sufficient submersible cable for the distance from the submersible motor to the control panel. Any splices required shall be fully vulcanized. Submersible cable shall have a label showing approval of the motor manufacturer for submersible use. Minimum wire size in the submersible cable shall be #8 AWG.

Well Seal shall consist of a two-part compression seal with rubber filling and with openings for pump column pipe, power cable, and vent pipe. Pump discharge shall be through a pitless adapter set a minimum of 10 feet below ground surface and sealed with a suitable non-lead seal or continuous weld.

- 1. Column Pipe
 - a. Domestic Well The discharge pipes shall be 1.5" and shall be Schedule 80 PVC compound treaded pipe or galvanized steel pipe, conforming to Federal Specification WW-P-406, weight A, Class 2, with threaded joints and coupled with black malleable iron couplings conforming to Federal Specification WW-P-521F, Type II, from pump to well discharge adaptor.
 - b. Fire Water Well The discharge pipes shall be 3" and shall be galvanized steel pipe, conforming to Federal Specification WW-P-406, weight A, Class 2, with threaded joints and coupled with black malleable iron couplings conforming to Federal Specification WW-P-521F, Type II, from pump to well discharge adaptor.
- 2. Tests

The pump and motor shall be tested by the manufacturer for performance in accordance with Section B6 of AWWA-E 101. Statement of testing by responsible party shall be provided to the Owner. After the pump and piping are installed, they shall be field tested for compliance with the specified capacity and head. Minimum acceptable wire-to-water efficiency for the pump is sixty percent (60%).

3. Name Plates

The pumps and motors shall have a standard nameplate securely fixed thereto in a conspicuous place, showing the serial number and name of the manufacturer. In addition, the nameplates for the pump shall show the capacity in gallons per minute at rated speed in revolutions per minute and head in feet. The motor nameplates shall show the horsepower, speed, rated current, voltage and rated frequency. The nameplate of a distributing agent only will not be acceptable.

4. Electrical Work

Electrical motor-drive equipment specified herein shall be complete with motor, motor starter and control panel. Motor starters shall be provided complete with properly sized thermal over-load protection and other appurtenances necessary for motor control indicated. Each motor shall be of sufficient capacity without exceeding the nameplate rating of the motor. Control panel shall be mounted by well drilling contractor per Electrical Plans and Specifications.

5. Guarantee Provision

The following equipment to be furnished under this section of the specifications shall be guaranteed for a period of one year from the date of acceptance thereof, either for beneficial use or final acceptance, whichever is earlier, against defective materials, design, and workmanship: Submersible pump, Pump motor, Combination pump starter and control unit

END OF SECTION

SECTION 33 21 50

FIRE WATER HOLDING TANKS

PART 1 - GENERAL

1.01 SUMMARY

- A. The work covered in this Section includes the furnishing of all plant, labor, equipment, materials, and performing all operations necessary to install fire water holding tank complete and ready to use.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.

1.02 SUBMITTALS

- A. Comply with pertinent requirements of the General Conditions.
- B. Submittals are required for the Fire Water Holding Tanks.
- C. As-built drawings
 - 1. The Contractor shall record on 1 set of Contract Drawings all changes from the locations originally indicated, and record final locations of all holding tanks as required.

PART 2 - PRODUCTS

2.01 HOLDING TANK

- A. Cylindrical steel holding tank shall be a minimum of 30,000-gallon capacity for the water fed from from the 6" fire water well. Tank shall be fabricated with materials as shown on the project drawings.
- B. The holding tank shall have a welded flanges as shown on project drawings sized for a 10" HDPE for draft water lines, 10" HDPE truck return water lines, 10" HDPE vent line, and 3" HDPE feed line from fire water well.
- C. Lifting eyelets shall be attached to the tank for ease of handling. All steel structural members shall be joined by electrical arc welding with fillets of adequate section for the joints involved. Welds shall be continuous inside and out. The supporting rings in the tank interior, where required, and structural plates shall have continuous welds. The tank shall be watertight.
- D. After welding, all inside and outside surfaces of the structure shall be wire brushed and cleaned to remove loose rust, mill scale, wire slag, oil, and other deleterious material. All surfaces, interior and exterior, including weld splatter and surface roughness shall be painted with 2 applications of TNEMEC or an approved equal. All scratches in coating due to handling and shipping shall receive 2 applications of coating material in the field prior to burial.

E. Tanks shall have a minimal wall thickness of 3/8 inch.

Holding tanks shall be constructed in compliance with uniform plumbing code (UPC).

2.02 PIPE AND FITTINGS

- A. Pipe shall be 10" HDPE SDR11 for all draft water lines, return lines, and vent line. Pipe shall be 3" HDPE SDR11 for feed line from fire water well.
- B. Fittings shall include mechanical joints or other approved restrained joints of similar materials to pipes.

2.03 ALARM SYSTEM

A. Provide float switches to automatically fill holding tank with water from fire water well and Red Alarm Light to indicate when tank is full. Float switch and wiring shall be intrinsically safe.

2.04 INSULATION

A. The Contractor shall furnish and install a 4-inch layer of board insulation equal to InfulFoam 40. The insulation shall be expanded polystyrene (EPS) and shall have a minimum compressive strength of 40 PSI and a maximum, water vapor permeability rate of 1.1 perminch, and maximum Water Absorption of 0.3% vol.

PART 3 - INSTALLATION

3.01 3.1 EXCAVATION

- A. The Contractor shall excavate all holes, set tanks at proper location and grade, and backfill as specified herein.
- B. The excavation hole for the holding tank shall be approximately 2 feet wider and longer than the tank. The bottom shall be smooth and level. Where over excavation occurs, the bottom shall be raised to final elevation in 6 inch compacted lifts. All water in the excavation must be removed and elevations checked before placing the tank. Skids shall allow for tank to be dragged into place. Contractor shall understand tank is heavy and shall require equipment large enough to safely move it into place without damaging tank. After setting the tank, it shall be filled with water to prevent floating, if necessary.

3.02 WELDING/PIPE INSTALLATION

- A. Furnish and install (2) two 10" steel draft ports with pipe extended into tank to a depth 6" above bottom of tank, (2) two 10" steel return ports with pipe extended 6" from top of tank, (1) one 10" steel vent line with pipe extended 6" from top of tank. Provide 90 degree elbows bolted or welded into place. Draft line extension supports shall be installed per tank manufacturer. Furnish and install (1) one 10" steel draft line on side of tank bolted or welded in place as shown on projectdrawings. Furnish and install (1) one 3" steel port for feed line on side of tank bolted or welded in place as shown on project drawings.
- B. Contractor shall provide a submittal detailing how they plan welding and installing piping.

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3.03 BACKFILLING

A. Backfilling shall not be done until the Owner's Representative has inspected and approved all work. Once tank is in place and all welding has been completed and inspected, Contractor shall carefully backfill. All backfilling shall be accomplished with loose material in lifts of 12 inches or less. Such backfilling shall be compacted by hand tamping to 90 percent of the maximum dry density as determined by the standard proctor test. Backfilled holes shall be mounded from 4 inches to 6 inches to allow for settlement and shall be graded to drain away from the tank centerlines.

3.04 INSULATION

A. Where insulation is required over the holding tank, prior to completing the backfilling operation, install a 4-inch layer of insulation board, located 6 inches above the top of the tank. The insulation shall extend 6 feet beyond the tank perimeter.

END OF SECTION

PAGE 1 OF 2

- SECTION 33 71 73 ELECTRICAL UTILITY SERVICES
- PART 1 GENERAL
- 1.01 SUMMARY
 - A. Section includes arrangement with Utility Company for permanent electric service; service provisions; and utility metering equipment.
- 1.02 SYSTEM DESCRIPTION
 - A. Utility Company: Homer Electric Association.
 - B. System Characteristics: 120/240 volts, single phase, three- wire, 60 Hertz. Ratings as indicated on the Drawings.
 - C. Service Entrance: Underground.

1.03 SUBMITTALS

- A. Division 1 Submittal Procedures: Submittal procedures.
- B. Submit Utility-Company-prepared as-built drawings with final record documents.
- C. Submit Meterbase and CT enclosure information to Serving Utility for approval prior to Ordering.
- 1.04 QUALITY ASSURANCE
 - A. Perform Work in accordance with Utility Company written requirements.
- 1.05 FIELD MEASUREMENTS
 - A. Verify measurements and clearance with existing conditions and electrical utility prior to starting work.
- 1.06 COORDINATION
 - A. Contact utility company regarding charges related to service installation. Coordinate with Owner's Project Manager for preparation and submittal of line extension application. All utility company charges related to this service extension shall be paid for directly by Owner.
 - B. Coordinate with utility company for relocation and/or removal of abandoned lines or lines interfering with construction.

PART 2 PRODUCTS

2.01 UTILITY METERS

- A. Furnished by Utility Company.
- 2.02 UTILITY METER BASE
 - A. Provided and installed by contractor.
 - B. Enclosure Rating: NEMA 3R
 - C. 13 terminal transformer rated meter socket with provisions for mounting 10 position test switches.
- 2.03 METERING TRANSFORMER CABINET
 - A. Provided and installed by contractor.
 - B. Enclosure Rating: NEMA 3R
 - C. Size: 600AMP: Per Serving Utility requirements.
 - D. Include bussing and cabling terminations for installation of bus bar CT's by utility
 - E. Provide with provisions for padlocking and sealing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Division 1 Administrative Requirements: Coordination and project conditions.
- B. Verify service equipment is ready to be connected and energized.

3.02 EXISTING WORK

A. Maintain access to existing service equipment, boxes, metering equipment, and other installations remaining active and requiring access.

3.03 INSTALLATION

- A. As detailed on the drawings.
- B. Effective ground all enclosures service entrance equipment enclosures.

END OF SECTION

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