

PROJECT MANUAL
FOR
Richland School District
Fran Rish Stadium Improvements

1330 Lee BLVD
Richland, Washington

Volume 1
DIVISION 00 – DIVISION 09



December 09, 2021



Design West Architects
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DIVISION 00 – CONTRACT REQUIREMENTS

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Subcontract Agreement

Chervenell Construction Company

107422 E Detrick PR SE, Kennewick, WA 99338
Phone (509) 735-3377 Fax (509) 735-8305

This agreement is made as of the October 2019 to fairly allocate responsibilities, risks and expenses arising out of the performance of this work, and is made and entered into by and between Chervenell Construction Company (hereinafter called Contractor) and:

SUBCONTRACTOR: _____
ADDRESS: _____
CITY, STATE, ZIP: _____
PHONE: _____
FAX: _____
CONTACT NAME: _____
CONTACT EMAIL: _____
(Hereinafter called Subcontractor)

Chervenell Construction Company has entered into a contract (hereinafter call Main Contract) with (hereinafter called Owner), to perform certain labor and furnish certain materials for the construction and completion of, located in as per the following:

1. General contract between Owner and Chervenell dated:
2. General and Supplementary Conditions as set forth in Specifications dated:
3. Project Specifications dated:
4. Project Drawings dated:
5. Addendums:
6. Alternates: _____

As prepared by all of which documents referenced above (Items 1-6) are hereinafter referred to as the Contract Documents.

In consideration therefore, Subcontractor agrees as follows:

1. Subcontractor shall provide all supervision, labor, services, materials, equipment, tools, supplies, and all other items needed to perform the following work:

Provide all work complete including, but not limited to, the following:

| | |
|------------|--|
| Documents | Introductory information, bidding requirements and contract requirements |
| Division 1 | General requirements |

Clarifications and Inclusions:



Exclusions:

1. Subcontractor shall provide the Subcontract Work in strict accordance with the Contract Documents, which document has been made, and retains, available to Subcontractor for review.
2. To be bound by all laws, government regulations, and orders and all terms and conditions of the Main Contract, to the extent of the work herein subcontracted, which provisions are hereby incorporated by reference, and all the terms and conditions of this Subcontract in its entirety pages 1-
3. Contractor, for full, complete, and faithful performance of this Subcontract, agrees to pay Subcontractor a lump sum of TBD subject to additions and deductions as herein provided.
4. Under provisions of Paragraph (O) herein, a bond is required in this Subcontract if contract value exceeds \$300,000: x yes no
5. Under provisions of Paragraph (Q) herein, the amount of insurance required for the Subcontract as per Appendix 2.

ADDITIONAL INSURED TO BE NAMED AS FOLLOWS:

CHERVENELL CONSTRUCTION COMPANY,

This Subcontract must be executed below by an officer or duly authorized representative of Subcontractor without modification and returned to Contractor within fifteen (15) days of its receipt. If not, and if Subcontractor elects to perform any of the Subcontract Work without first securing a fully executed Subcontract, then Subcontractor shall be deemed to have accepted with Subcontract unmodified, as issued. The effective date of this Subcontract shall be the earlier of fifteen (15) days following its receipt by Subcontractor, or the date of Subcontractor's signature without modification. Subcontractor's delivery to Contractor of the executed Subcontract without modification, along with suitable bonds, if required herein, and proof of insurance as required herein, are all express conditions precedent to any payment to Subcontractor.

IN WITNESS WHEREOF, CONTRACTOR and SUBCONTRACTOR have executed this agreement, effective the date of the last authorized signature unless otherwise agree.

CHERVENELL CONSTRUCTION CO.

By _____
Brandon Mayfield, (or) Manny Torrez

Registration Number CHERVC*254KW

Date _____

«COMPANY»

By _____
Contractor (Authorized Signature)

Printed Name _____

Registration Number _____

Federal Tax ID No. _____

Incorporated: Yes _____ No _____

Worker's Compensation Acct. ID _____

UBI No. _____

Date _____

EQUAL EMPLOYMENT OPPORTUNITY POLICY

Whereas, Contractor is an equal opportunity employer, "It is our policy to assure that applicants for employment are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, handicap, or veteran status. This assurance shall apply in practice of: employment, upgrading, demotion or transfer; recruitment of recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including on the job training.



SUBCONTRACT GENERAL CONDITIONS

A. OBLIGATIONS AND RESPONSIBILITIES

It is agreed that Subcontractor will assume toward Chervenell (herein referred to as Contractor) all obligations and responsibilities which Contractor has assumed toward Owner under the Main Contract to the extent of the work herein subcontracted, and Subcontractor shall be entitled to all privileges and protections granted Contractor by Owner under the Main Contract. In case of conflict between the terms of this Subcontract and the Main Contract, this Subcontract shall control. Subcontractor agrees not to assign or subcontract a substantial portion of the performance of this Subcontract without the prior written consent of Contractor. Subcontractor shall designate in writing all lower-tier subcontractors to Contractor and shall not subsequently change lower-tier subcontractors without Contractor's approval. Contractor shall furnish to Subcontractor, upon subcontractor's request, the legal description of the premises covered by the Main Contract. A copy of the Main Contract will be made available upon written request.

B. DRAWINGS/SUBMITTAL

Subcontractor agrees to furnish drawings, specifications, final selections of materials and other specified items in the quantity required by the Main Contract for approval by Owner's agent so as not to delay progress of the work.

C. SCHEDULING

Contractor shall give Subcontractor advance notice of anticipated starting date for Subcontract work. Contractor shall consult with Subcontractor on development and update of a project construction schedule at Subcontractor's request and shall make such schedule available to Subcontractor at Subcontractor's request. Subcontractor to provide scheduling information, indicating crew days needed for various portions of work, including those by 2nd tier subcontractors. Subcontractor shall start work on the date named by Contractor and shall complete the portions and the whole of the work herein described at such times as will enable Contractor to timely comply with the Main Contract. Subcontractor will cooperate with Contractor if revisions need to be made to incorporate overall schedule.

Subcontractor is to prepare his crew prior to arrival on site. Subcontractor shall assign an English-speaking foreman to this project. This foreman shall remain the primary contact person in the field for the entire project unless requested in writing to the Contractor's office and approval is received. Subcontractor's foreman and/or project leader are to check in with Contractor's superintendent upon arrival and departure. Subcontractor shall cooperate with Contractor and other Subcontractors.

Prior to arriving at the site, if applicable to the product being installed, the Subcontractor will provide installer certificates, certifications for specified materials, and any warranty or special manufacturer conditions related to the product being installed.

Subcontractor is to staff the job with sufficient manpower to perform the work as needed and according to Contractor's overall project schedule during Contractor's normal working hours, 5 days a week. If Subcontractor chooses to work alternate shifts or hours, it must be previously agreed to by Contractor. In addition, if alternate work schedule requires additional supervision, a charge may occur.

Subcontractor will be bound by any provisions in the Main Contract for liquidated damages and, if liquidated damages are assessed against Contractor by Owner, shall pay such damages for any delay to the extent caused by Subcontractor.

Subcontractor shall perform the work in a diligent, efficient, and skillful manner, as the work or any portion thereof becomes available to allow Contractor to promote the general progress of the entire construction and so that the work shall not interfere with, hinder, or delay other work.

Should Subcontractor delay the progress of the work or of the project, Subcontractor shall take necessary action as required to meet and maintain job progress, without additional compensation, and shall be liable to reimburse Contractor for damages resulting from such delay.

D. PAYMENTS



Subcontractor shall submit to Contractor progress billing no later than the 20th day of each month to enable Contractor to timely apply for payment from Owner. Subcontractor will submit the progress billing on Contractor's standard billing forms. For contracts greater than \$5,000, prior to submitting first progress billing, Subcontractor will be required to submit a schedule of values (SOV) for the project. Upon receipt of SOV, Contractor will promptly review and provide any necessary revisions to the Subcontractor. All subsequent progress billings will be made based on the mutually agreed to SOV. The SOV will be used for payment purposes only and shall not relieve the Subcontractor to perform all work per subcontract.

Unless otherwise mutually agreed, Contractor shall withhold retainage from Subcontractor in the amount of 5% or as described in the project specifications and as required by law. Additionally, you could be subject to a project closeout percentage (see Special Provisions) which will be released upon approval of closeout documentation. Contractor's obligation to release retainage to Subcontractor shall be subject to proof that there are no unpaid claims which would provide the basis of a lien against the premises, retainage or payment bond, or subject to (1) withholding of sufficient funds, or (2) furnishing an adequate and sufficient payment and performance bond. Subcontractor shall be paid for work to date of Contractor's last progress billing date, as approved by the Architect or Engineer, within 10 days after Contractor has received payment for such progress billing. Final payment for work under this Subcontract shall be made within 10 days after Contractor has received final or complete payment provided Subcontractor has completed its work and fulfilled each of its obligations under this Subcontract. When required by Contractor, and as a pre-requisite for any payment, Subcontractor shall provide in a form satisfactory to Contractor close out documentation as specified, partial lien releases, claim waivers and affidavits of payment from Subcontractor, and its sub-subcontractors and suppliers of any tier, for the completed portion of Subcontractor's work.

If the Main Contract permits payment for materials delivered to the job site or to satisfactory storage facilities, Subcontractor may invoice for materials so delivered and receive payment as outlined above; provided, however, that such stored materials, shall be at the risk of Subcontractor until acceptance of the Subcontract work. Subcontractor shall notify Contractor of the assignment of the proceeds of this Subcontract prior to such assignment and shall require the acceptance by Assignee of the terms of this Subcontract including the obligation for adjustments and return to Contractor of overpayments. Subcontractor acknowledges that all payments accepted by him or which are otherwise due under this Subcontract shall constitute a trust fund in favor of laborers, material men, governmental authorities, and all other who are legally entitled to claim a lien on the premises covered by this Subcontract or otherwise file a claim against any retainage or payment bond. Subcontractor shall pay its own subcontractors and suppliers all sums owed them within 10 days of receipt of payment from or on behalf of Contractor. Subcontractor agrees that no assignment of any payment otherwise due under this subcontract shall be effective without first securing the express approval of any assignee to limitations contained in this subsection.

Progress payments shall be deemed advances and are subject to adjustment at any time prior to final payment for errors, overpayment of Contractor's good faith determination that the remaining balance of payments may be insufficient to insure completion of work covered by this Subcontract or to pay lien, retainage, or bond claims. If Contractor determines in good faith that Subcontractor is obligated to Contractor or anyone else for labor, fringe benefits, taxes, supplies, materials, equipment rental or other proper charges against the work covered by this Subcontract, the amount of such obligation may be deducted by Contractor from any payment or payments, including retainage, made under this provision. Provided further that Contractor may from time to time require, and Subcontractor shall promptly provide, a statement in writing setting forth what amounts, if any, are due or payable by Subcontractor to third parties for labor, fringe benefits, taxes, supplies, materials, equipment, or other proper charges against the work in connection with, or arising out of the performances of, this Subcontract.

If requested by Contractor, the Subcontractor's representative (not foreman/project leader) will meet Contractor's onsite representative to review outstanding billing items, review quantities, or any other billing concern of the Contractors.

No payments will be made to the subcontractor until (a) executed contract, (b) proof/cert of insurance, (c) if applicable - bonds are delivered (d) conditional lien releases for current month are submitted (e) all unconditional lien releases for prior months are submitted.

E. CHANGE ORDERS

Contractor may, without invalidating this Subcontract, order in writing extra work or make changes by altering, adding to, or deducting from the work and Subcontract price shall be adjusted accordingly. All such work shall be executed under conditions hereof and of the Main Contract, except that any claims for extension of time caused thereby must be agreed upon at the time of ordering of such change. In the event that an agreement cannot be reached regarding the scope, cost and time impact of a particular change, the Contractor will waive this requirement for the particular change affected.

Subcontractor shall make no claims for extras unless the same shall be agreed upon in writing by Contractor prior to the performance of any such extra work. If additional work has been fully accepted by Owner, payment shall be made to Subcontractor within 10 days after payment to Contractor unless the request for additional work originated with Contractor rather than with Owner, in which case payment will be made within 20 days following acceptance of the work by Contractor. In case of any dispute over adjustment of the Subcontract price or time, Subcontractor shall proceed with the work, and the dispute shall be resolved in accordance with the procedures set forth in the Main Contract, to the extent that Contractor is bound by such procedures, otherwise by the procedures set forth in Paragraph (T). Subcontractor shall not be entitled to any additional compensation or extension of time unless Subcontractor has made a written request to Contractor for such within sufficient time to permit Contractor to give timely notice to Owner.

Subcontractor acknowledges that, unless expressly stated otherwise within a written change order, any change in the contract price and time effected through a written change order shall constitute full payment and accord and satisfaction for all costs incurred, labor performed, material and equipment furnished, and any delay, acceleration, or loss of efficiency associated with the change in the work.

The Contractor reserves the right to ask for work to be completed on a time and materials basis at its sole discretion. Should time and materials work be requested, the Subcontractor will use Contractor's standard time and materials form or another previously approved form. Time and material tickets/invoices must be checked and approved daily by the site superintendent. Failure to coordinate with the site superintendent on approval of work will result in payment for these items being delayed or withheld entirely.

F. NATURE OF WORK

Subcontractor has satisfied itself as to the nature and location of the work, the character, kind and quantity of material to be encountered, the character, kind and quantity of equipment needed, the location, conditions and other matters which can in any manner effect the work under this Subcontract agreement and acknowledges that Subcontractor has had a reasonable opportunity to examine the site, all of the Main Contract documents and this Subcontract. Prior to commencing work, Subcontractor shall examine the site and any surfaces upon which work is to be performed and shall notify Contractor in writing of any conditions which might adversely effect its work; failure to do so will constitute a waiver of entitlement to any additional compensation or contract time arising out of such conditions. Such waiver shall not apply to latent or hidden conditions unknown to Subcontractor following a reasonable examination, unless disclosure of such conditions is required under the Main Contract. This clause shall not be understood to relieve Subcontractor of any additional notice requirements under this Subcontract or the Main Contract.

Subcontractor is responsible for all work described in the project drawings, specification, addendums, selected alternates, and all other bid clarifications. Failure to fully examine the documents will not alleviate Subcontractor of performing the complete scope of work.

G. SUBCONTRACTOR EMPLOYER

Subcontractor has the status of "employer" as defined by Industrial Insurance, worker's compensation, unemployment compensation, social security, and other similar acts of the federal, state, and local government. Subcontractor shall withhold from its payroll applicable social security taxes, worker's compensation and unemployment compensation contributions, and withholding taxes and pay the same. Contractor shall in no way be liable as an employer of, or on account of, any employees of Subcontractor. Before final payment is made under this Subcontract, Subcontractor shall furnish Contractor affidavits certifying that it has complied with these laws, rules and regulations. Subcontractor hereby agrees to indemnify Contractor for any and all liability under such laws arising from the work performed under this Subcontract.

H. PERMITS, TAXES, LICENSES

Subcontractor shall obtain and pay for all permits, fees and licenses necessary for the performance of this Subcontract and shall pay any and all federal, state, and local taxes, applicable to the work to be performed under this Subcontract. Owner or Contractor shall obtain and pay for the initial building permit applicable to the Main Contract and unless stated otherwise herein shall be responsible, as between Contractor and Subcontractor, for payment of state sales/use taxes applicable for the project.

I. MATERIALS

Subcontractor shall promptly secure delivery commitments, place orders for materials, equipment and services required in connection with the work to avoid delays and shall furnish copies of procurement documents and purchase orders upon request.



Subcontractor shall furnish goods, materials, equipment and service in compliance with all applicable safety, certification and testing codes and laws. Subcontractor shall ship all goods, materials and equipment to the project site, and all transportation, freight or delivery charges shall be prepaid by Subcontractor. Subcontractor shall be solely responsible for receiving and unloading shipments.

Subcontractors will deliver materials to the site only as required for the ongoing work. Verify delivery dates prior to shipment. Due to shortage of space, materials delivered too early will be returned.

Subcontractor is to provide **ALL** equipment necessary to perform the scope of work. If, in an emergency, Contractor's equipment is used, a rate comparable to the local rental market will be assessed and deducted from current pay request. Any arguments over billing will eliminate the possibility of future use. In addition to the rental rate, should the subcontractor use any Contractor equipment the subcontractor agrees that the employee using the equipment has been properly trained, possesses any necessary licenses or training certificates, and the subcontractor agrees to compensate Chervenell for any damages done to the equipment or by the equipment while the equipment is being operated by the subcontractor's employee or 2nd tier subcontractor. Should an accident occur that would require replacement of equipment the subcontractor will be responsible for all costs associated with removal of damaged equipment from the site, investigation reports, mobilization and rental of replacement equipment, etc.

If Subcontractor has no personnel on site to unload, trucks will either be turned around, or unloaded at the rate of \$120.00 per hour with 1-hour minimum charge. If, in an emergency, the Subcontractor needs to utilize the Contractor's lifting equipment for unloading all provisions described in the previous paragraph with regard to equipment use apply.

Procurement documents, factory confirmations, or purchase orders are to be provided within three (3) working days of the Contractor's request. If the factory confirmation is not sufficient to meet the projects schedule, it is mutually understood that the particular material purchase agreement may be void, and the Contractor/Subcontractor may look elsewhere for the material.

Materials delivered by or for Subcontractor and intended to be incorporated into the construction there under shall remain on the job site and shall become property of Owner upon payment, but Subcontractor may repossess any surplus materials remaining at the completion of the contract. All scaffolding, apparatus, ways, works, machinery, and plants brought upon the premises by Subcontractor shall remain their property. It shall be Subcontractor's responsibility to unload, store, and protect its materials, to bear the risk of loss thereof and to protect such material against loss until actually incorporated into the work, and until the work is accepted, even though title thereto may previously have passed to the Owner under the preceding provisions, except that Subcontractor shall not bear that portion of such loss to the extent it arose out of the fault of Contractor or its employees.

Contractor shall have sole authority with respect to access and usage of the project site. Subcontractor shall notify Contractor prior to each delivery of goods, materials, and equipment. Contractor, in its sole discretion, shall determine times and location for all such deliveries. Subcontractor shall establish temporary offices, storage facilities or other temporary facilities at the project site only upon approval by and in locations designated by Contractor. Subcontractor shall not post or display signs, banners or other announcements or advertising at the project site without the express prior approval of Contractor.

J. TAKEOVER

In the event Contractor's work under the Main Contract is terminated, other than for Contractor's default, prior to project completion, an equitable adjustment to the contract price for work performed under this subcontract prior to such termination will be made as provided for in the Main Contract, if no such provision exists, then by mutual agreement, or, failing either of these methods, by arbitration as provided for in the Disputes clause of this Subcontract. Subcontractor shall be entitled to prospective profits on unperformed work only to the extent Contractor is able to recover such profits.

In the event the Owner temporarily suspends work under the Main Contract, the Contractor may order Subcontractor to suspend work under this Subcontract. Subcontractor shall not be entitled to any additional compensation or damage for such suspensions, except, and only to the same extent, Contractor received additional compensation from Owner under the provisions of the Main Contract for work covered by this Subcontract.

If Subcontractor refuses or fails to supply enough properly-skilled workers or materials to maintain the schedule of work, refuses or fails to make prompt payment to sub-subcontractors or suppliers of labor, taxes, materials or services, fails to correct, replace, or re-execute faulty or defective work done or materials furnished, disregards the law, ordinances, rules, regulations or orders of any public authority having jurisdiction, files for bankruptcy, or is guilty of a material breach of this Subcontract, and fails to correct the default and maintain the corrected condition within not less than three (3) working days of receipt of written notice of the default, then Contractor, without prejudice to any rights or remedies otherwise available to it, shall have the right to any or all of the following remedies:

1. Supply such numbers of workers and quantity of materials, equipment, and other facilities as Contractor deems necessary for the completion of Subcontractor's work, or any part thereof, which Subcontractor has failed to complete or perform after the above notice, and to charge the cost thereof to Subcontractor who shall be liable for the payment of same including reasonable overhead and profit.
2. Contract with one or more additional subcontractors to perform such part of Subcontractor's work as Contractor shall determine to provide prompt completion of the project and charge the cost thereof to Subcontractor.
3. Withhold payment of any monies due or become due Subcontractor pending corrective action to the extent required and to the satisfaction of Contractor.
4. Terminate this Subcontract, use any materials, implements, equipment, appliances, or tools furnished or belonging to Subcontractor on the project, to complete Subcontractor's work and furnish those materials, equipment, and/or employ such workers as Contractor deems necessary to maintain the orderly progress of the work. Subcontractor's equipment shall only be utilized when equivalent equipment is not locally available to lease and will not be supplied by a substitute subcontractor and when procurement of substitute equipment will not delay completion of the Main Contract. All of the costs, including reasonable overhead, profit and attorney's fees, incurred by Contractor in arranging to and performing Subcontractor's work shall be charged to Subcontractor and Contractor shall have the right to deduct such expenses from monies due or to become due Subcontractor, and Subcontractor shall be liable for the payment of any expenses incurred in excess of the unpaid balance of the Subcontract price.
5. In the event of any emergency, Contractor may proceed as above without notice. For the purpose of this provision, an emergency is defined as the Subcontractor's personnel posing threat of bodily harm, causing defamation to the project, or an Act of God.

K. UNIT PRICE

In the event this Subcontract contains unit price items it is understood and agreed that any quantities mentioned are approximations only and subject to change as required by the Main Contract or as ordered and directed by Contractor.

L. QUALITY

Materials condemned by Contractor, Architect/Engineer, or Owner as failing to conform to the Main Contract, working or not, shall upon notice from Contractor be immediately removed by Subcontractor. Failure of Contractor to immediately condemn any work or materials as installed shall not in any way waive Contractor's right to object thereto at any subsequent time.

Subcontractor shall perform a pre-punch and make correction to all work in place each month. Verification that this has taken place will be required from the site superintendent prior to payment being released.

M. JOB DAMAGE

Job damage caused by Subcontractor to work other than its own shall be reported immediately to Contractor and Subcontractor shall be responsible for its repair. Job damage caused by Contractor to work of a Subcontractor shall be reported immediately to Subcontractor and Contractor shall be responsible for its repair. Should damage occur at the site and go unreported, the cost of repairs will be equally distributed to all subcontractors onsite when the damage occurs.

N. HOUSEKEEPING AND SAFETY

Subcontractor shall remove, haul away, and legally dispose of all refuse, waste and debris produced by its operation. Refuse shall not be permitted to accumulate to the extent that it interferes with free access to the work site or creates a safety concern. Avoidance of safety hazard through good housekeeping is a material part of Subcontractor's obligations. In the event of Subcontractor's failure or refusal to meet these requirements, refuse may be removed by Contractor and charged against the accounts of Subcontractor, provided that Subcontractor has received prior written notice. Should this occur the Subcontractor will be charged on a time and material basis. Labor will be charged out at \$60 per man hour and dump fees will be charged at actual cost, plus hauling fees, and 15% overhead and profit. In the event of the existence of a safety hazard, Contractor may proceed as above without prior notice.

Subcontractor agrees to participate in a weekly cleanup effort each week they are onsite. The Subcontractor will provide an employee with broom for this joint cleanup effort. This will take place one afternoon each week. The day of the week will be determined by the site superintendent and the beginning of the project.

Storage of materials will not be permitted onsite, unless in trailer or previously agreed upon location. All storage, lay-down yards, trailer locations, etc. will be reviewed and agreed to by Contractor's site supervisor prior to any such items being brought to the site. Other trades affected by the Subcontractor's scope must be considered when scheduling delivery of materials.

Subcontractor shall take all necessary safety precautions pertaining to its work and the conduct thereof, including but not limited to compliance with all applicable laws, ordinances, rules, regulations and orders issued by a public authority, whether federal, state, local or other, the Federal Occupational Safety and Health Act, the Washington Industrial Safety and Health Act, and any safety measures requested by Contractor. Subcontractor agrees to comply with all Contractor Operating & Safety Procedures. A copy of these procedures are available at all Contractor's jobsites. Subcontractor shall at all times be responsible for providing a safe worksite and responsible for the safety of all personnel, equipment and materials within Subcontractor's care, custody or control. Subcontractor shall promptly provide Contractor with written notice of any safety hazard or violation found anywhere on or adjacent to the construction site.

Subcontractors will provide all equipment and comply with safety codes for fall protection systems either for scaffolds, safety nets, or personal fall protection systems. **Subcontractors that relate to fall protection must have their project specific fall protection plan on file with Contractor's superintendent for each jobsite.** Please submit to our office.

O. BOND

If the project inclusions of the Subcontract require Subcontractor to supply bonds for this project, then Subcontractor shall at its own expense furnish Contractor, within 10 days of receipt of this Subcontract, performance and payment surety bonds, acceptable to Contractor, in an amount equal to the Subcontract price. The bonds shall be conditioned upon the full and faithful performance of all terms, provisions, and conditions of this Subcontract and upon payment for all labor, materials, equipment and supplies used in the prosecution of the work described herein.

P. WORKERS' COMPENSATION

Subcontractor shall furnish to Contractor evidence that it has in force Workers' Compensation Insurance including Employer's Liability, as may be required by the jurisdiction or jurisdictions in which the work is being performed. Such evidence shall be in the form of an insurance certificate issued by an insurer satisfactory to Contractor and shall provide not less than 10 days prior written notice to Contractor of cancellation or reduction in coverage. In the event Subcontractor fails to maintain any and all insurance required by this Subcontract during the entire life of this Subcontract, Contractor may at its option, and without waiver of other available remedies, purchase such insurance in the name of Subcontractor and deduct the cost of same from payments due Subcontractor.

Q. INSURANCE

Subcontractor shall obtain and keep in force during the term of this Subcontract, comprehensive general liability insurance with dollar limits and coverage equal to, or greater than, the minimum specified in the Main Contract for Contractor and not less than the types and amounts of coverages noted in Appendix 2. Subcontractor shall furnish to Contractor evidence of this insurance in the same form as described in Paragraph (P) including the provisions regarding notice or cancellation or reduction in coverage.



Such insurance shall include contractual liability coverage applicable to the indemnity provisions (See Appendix 1) of this Subcontract.

Subcontractor shall name Contractor and Owner as additional insured under Subcontractor's policies, but coverage for such additional insured shall be limited to (1) losses involving the fault (without regard to liability) of Subcontractor or its agents, employees, sub-subcontractors or suppliers of any tier, or (2) in situations where fault is not a requirement for liability, losses caused or contributed to by Subcontractor or its agents, employees, sub-subcontractors or suppliers of any tier.

R. SUB-TIER SUBCONTRACTOR

Any sub-tier subcontractor shall be bound to Subcontractor to the same extent Subcontractor is bound to Contractor and to the same extent Contractor is bound to Owner. This form may be used for sub-tier subcontracts and when so used, the terms Contractor shall mean Subcontractor and the term Subcontractor shall mean sub-tier Subcontractor. Subcontractor shall provide a list of sub tier Subcontractors and all suppliers to Contractor for approval for each project.

S. MODIFICATIONS

No modifications to, or waiver of any rights under, this agreement shall be valid or binding on the parties to this Subcontract unless the same be in writing. Failure of Contractor to insist upon strict performance of any term or condition of this Subcontract, or to exercise any option herein conferred on one or more instances, shall not be construed to be a waiver of such performance or option, or of any other covenants or agreements, on subsequent occasions, but the same shall be and remain in full force and effect.

T. DISPUTES

1. Pass-through Claims: In the event of any dispute or claim between Contractor and Owner which directly or indirectly involves the work performed or to be performed by Subcontractor or in the event of any dispute or claim between Contractor and Subcontractor caused by or arising out of conduct for which Owner may be responsible, Subcontractor agrees to be bound to Contractor and Contractor agrees to be bound to Subcontractor to the same extent that Contractor is bound to Owner by terms of the Main Contract and by any and all procedures and resulting decisions, findings, determinations, or awards made thereunder by the person so authorized in the Main Contract, or by an administrative agency, board, court of competent jurisdiction or arbitration. If any dispute or claim of Subcontractor is prosecuted or defended by Contractor together with disputes or claims of Contractor's own, and Subcontractor is not directly a party, Subcontractor agrees to cooperate fully with Contractor and to furnish all documents statements, witnesses, and other information required by Contractor for such purpose and shall pay or reimburse Contractor for all expenses and costs including reasonable attorney's fees incurred in connection therewith, to the extent of Subcontractor's prorate interest in such claim or dispute.

Subcontractor agrees to be bound by the procedure and final determinations as specified in the Main Contract and agrees that it will not take, or will suspend, any other action or actions with respect to any such claims and will pursue no independent litigation with respect thereto, pending final determination of any dispute resolution procedure between Owner and Contractor. It is expressly understood and agreed that as to any and all claims asserted by Subcontractor in connection with this project arising from the actions or fault of Owner, Contractor shall not be liable to Subcontractor for any greater amount than Owner is liable to Contractor, less any markups or costs incurred by Contractor. As to any claims asserted by Subcontractor for, or on account of, acts or omissions of Owner or its agents or design professionals, at the sole option of Contractor, Subcontractor agrees to prosecute such claims in Contractor's name. For any amount recovered or collected (whether through proceedings or settlement) by Subcontractor, Contractor shall be entitled to 10% of such amount received or collected as its mark-up for such claims. Subcontractor shall have full responsibility for preparation and presentation of such claims and shall bear expenses thereof including attorneys' fees.

2. Arbitration: All other claims, disputes, and other matters in question between Contractor and Subcontractor arising out of, relating to, the Main Contract or this Subcontract, the breach thereof, or work thereunder (for which a dispute resolution procedure is not otherwise provided in the Main Contract), shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then obtaining, unless the parties mutually agree otherwise. Contractor and Subcontractor agree to be bound by the findings and award of such arbitration finally and without recourse to any court of law other than for the enforcement of the arbitrator's decision. In any dispute between Contractor and Subcontractor, the prevailing party shall be awarded its reasonable attorney's fees and costs.

3. Mediation: As a condition precedent to the hearing of any trial or arbitration, the parties to the Subcontract shall submit any and all disputes between them to non-binding mediation with the assistance of a recognized professional mediation service. The parties shall each designate a representative with full settlement authority who will participate for at least four hours in the mediation. The parties shall bear equally all expenses, exclusive of attorney's fees, associated with the mediation.

U. MISCELLANEOUS

This Subcontract shall be considered to have been made in and shall be interpreted under the laws of the State of Washington. Subcontractor shall comply with all federal, state and local laws, regulations and other government enactments prohibiting discrimination on the basis of race, religion, sex or national origin. This Subcontract represents the final understanding of the parties and Contractor assumes no responsibility for any different understanding or any representation made by any of its officers, agents, or others prior to the execution of this Subcontract unless expressly stated herein.

V. ONSITE EXPECTATIONS AND REQUIREMENTS

The Subcontractor is responsible to provide each of its employees and any 2nd tier subcontractors with all necessary provisions to complete their work in a professional manner. Subcontractors will provide their own telecommunications and other jobsite communication mediums including radios, cell phones, email, fax, etc.

No pets of any kinds are allowed on the project property. Failure to comply will result in permanent removal of the worker from the project site. Subcontractor agrees to attend all coordination meetings as requested by Contractor. Per Contractor's safety policies, smoking at the site is prohibited unless done in specifically designated areas. Failure to comply can result in permanent removal of the worker from the site. If the area is not clearly designated Subcontractor's employees should contact the Contractor's site supervisor and request a location that is acceptable to Contractor.

Special Provisions

1. Subcontractor to withhold 3.0% as "Project Closeout" from progress billings. This 3.0% "Project Closeout" will be released to Subcontractor upon approval of closeout documentation.
2. Certified Payroll - This project requires certified payroll to be submitted. Subcontractor to submit certified payrolls on the LNI website each week.
3. Apprentice/Journeyman Participation - This project requires this reporting. This information will be calculated when you submit your certified payroll online at LNI. No report to submit.
4. Statement of Intent - This form can be obtained through the Dept. of Labor and Industries and must be submitted to Contractor prior to the Subcontractor being onsite.
5. Affidavit of Wages Paid - This form is a requirement of your project closeout documentation. Any delay in providing Contractor with this information will result in a delay in retainage being released as the state will not accept our closeout information without the affidavits .
6. Meeting Attendance - All vendors are required to attend meetings as requested by Contractor. Failure to attend the meetings may result in a monetary fee \$100/meeting to be back- charged off the contract value.



APPENDIX 1

INDEMNIFICATION ADDENDUM

("Subcontractor") agrees to defend, indemnify, and hold harmless Chervenell Construction Company ("Contractor") from any and all claims, demands, losses, and liabilities to or by third parties arising from, resulting from, or connected with services performed or to be performed under his Subcontract by Subcontractor, its agents or employees, even though such claims may prove to be false, groundless or fraudulent, to the fullest extent permitted by law and subject to the limitations provided below.

Subcontractor's duty to indemnify Contractor shall not apply to liability for damages arising out of bodily injury to persons or damage to property caused by or resulting from the sole negligence of Contractor or its agents or employees. Subcontractor's duty to indemnify Contractor for liability for damages arising out of bodily injury to persons or damage to property caused by or resulting from the concurrent negligence of (a) Contractor or its agents or employees, and (b) Subcontractor or its agents or employees shall apply only to the extent of negligence of Subcontractor or its agents or employees.

Subcontractor specifically and expressly waives any immunity that may be granted it under the Washington State Industrial Insurance Act, Title 51 RCW, Idaho Worker's Compensation Laws, Title 72, Oregon Worker's Compensation Act, Chapter 656 ORS or the Laws of any State. Further, the indemnification obligation under this Subcontract shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable to or for any third party under workers' compensation acts, disability benefits acts, or other employee benefits acts; provided Subcontractor's waiver of immunity by the provisions of this paragraph extends only to claims against Subcontractor by Contractor, and does not include, or extend to, any claims by Subcontractor's employees directly against Subcontractor.

Subcontractor's duty to indemnify Contractor for liabilities or losses other than for bodily injury to persons or damage to property shall apply only to the extent of the fault of Subcontractors or its agents, employees, sub-subcontractors or suppliers of any tier, except in situations where fault is not a requirement for liability in which case indemnity will be provided to the extent the liability or loss was caused by Subcontractor or its agents, employees, sub-subcontractors or suppliers of any tier.

Defense cost recovery shall include all fees (of attorneys and experts), and costs and expenses incurred in good faith. In addition, Contractor shall be entitled to recover compensation for all its in-house expenses including materials and labor consumed in its defense.

THE UNDERSIGNED HEREBY CERTIFY THAT THIS ADDENDUM WAS MUTUALLY NEGOTIATED.

Date: _____

Dated: _____

Contractor:
CHERVENELL CONSTRUCTION CO

Subcontractor: _____

By: _____

By: _____

Title: _____

Title: _____

APPENDIX 2

Insurance

a. Coverage and Limits: Subcontractor shall, at its sole expense, maintain such insurance as will protect against claims for bodily injury or for damage to property which may arise out of Subcontractor's work or by the work of any lower tier subcontractor or by anyone employed by any of them or by anyone for whose acts any of them may be liable. Minimum coverage and limits of liability for all insurance shall be as specified in this Appendix 2, or if greater, any coverage or limits of liability specified in the Main Contract or required by law. If Subcontractor's existing policy(s) provides higher limits than those specified above, the higher limits shall be applicable, and the certificates of insurance provided by Subcontractor shall reflect those higher limits. The coverage required herein shall extend one year after final acceptance of the project by the Owner or such longer period as the Main Contract requires. All coverage shall be placed with an insurance company duly license in the State where the project is located with an A.M. Best Rating of A- or better. Such insurance shall include, but no limited to:

- | | |
|------------------------------------|--|
| 1. Commercial General Liability | \$1,000,000.00 each occurrence; \$1,000,000.00 aggregate. |
| 2. Umbrella/Excess Liability | \$1,000,000.00 each occurrence |
| 3. Comprehensive Auto Liability | \$1,000,000.00 each occurrence. Coverage shall include all owned, hired and non-owned vehicles. |
| 4. Employer's Liability | \$1,000,000.00 each accident and each employee, limit by disease. Where applicable, this shall include United State Longshoreman's and Harbor Workers Act Insurance, including Coverage B - Employer's Liability (Maritime), with limits not less than the Bodily injury limits required by the Main Contract but in no event less than \$1,000,000.00. |
| 5. Worker's Compensation | Statutory Limits pursuant to the Laws of the State where the work is performed. |
| 6. Professional Services Liability | \$1,000,000.00 each occurrence; \$2,000,000.00 aggregate; required if Professional Services provided - limits must be specific to this project and must not be encumbered or reduced in value during the duration of Subcontract, except by claims or insurable events that may take place on this Project. There shall be a 30-day written notice to Contractor of any reduction of coverage limits of liability for this policy. This policy shall have an extended reporting period of at least 24 months from the Substantial Completion of the Project. Subcontractor shall provide a certificate of insurance naming Contractor as a certificate holder. |

b. Commercial General Liability Insurance:

a. Commercial General Liability Insurance coverage shall be based on Insurance Services Office Form CG 00 01 10 01 or its equivalent and shall confer a status or contain an endorsement (Form CG 2503, or equivalent) required that the general aggregate limit of liability shall apply to this Project. The coverage shall also be based on an occurrence form and shall include, but not be limited to, coverage for liability arising from premises, operations, independent contractors, products and completed operations, personal and advertising injury, broad form property damage, explosion, collapse, underground hazards, and liability assumed under an insured contract (including the tort liability of another assumed in a business contract). There shall be no endorsement or modification to the Commercial General Liability form arising from explosion, collapse, underground property damage or work performed by subcontractors.

b. Commercial General Liability insurance shall not contain an endorsement or exclusion excluding injury or damage arising from a prior occurrence causing continuous or progressively deteriorating injury or damage. For work which involves assisted living or residential construction, Commercial General Liability Insurance shall not contain an endorsement or exclusion excluding assisted living/resident construction. For work that involves an exterior insulation and finish system, Commercial General Liability Insurance shall not contain an endorsement or exclusion excluding damage or injury caused directly, indirectly, in whole or in part by the exterior insulation and finish system or by the design, installation, construction or manufacture thereof. If Subcontractor is to provide any service involving asbestos,



lead abatement, or other pollutant, Subcontractor shall also provide insurance coverage for asbestos/lead paint abatement/removal or pollution.

c. Certificate/Endorsements:

a. Subcontractor shall obtain both an Additional Insured Status or Endorsement to (i) its Commercial General Liability policy (Form CG 20 10 11 85 or a combination of ISO Forms 20 10 10 01 and CG 20 37 10 01 or equivalent) which includes completed operations coverage, which name Contractor, Owner, and any other entity required by the Main Contract, as "additional insured". The foregoing "additional insured" status or endorsements shall include coverage for liability arising out of (a) completed operations, (b) operations performed for Contractor or Owner by Subcontractor, (c) acts or omissions of Contractor or Owner in connection with general supervision of Subcontractor's operations, and (d) claims for bodily injury, death or property damage brought against Contractor or Owner by Subcontractor's employees, or the employees of Subcontractor's subcontractors of any tier, however cause, related to the performance of the work under the Main Contract. **Coverage shall be afforded to Additional Insured whether or not a claim is in litigation.** The insurance afforded to the additional insured under Subcontractor's policies shall be primary insurance and not excess over, or contributing with, any insurance purchased or maintained by additional insured, and shall confer a status or contain an endorsement which provides the same. In the event Subcontractor and Contractor are covered by Contractor's insurance, Contractor's policy shall only apply excess of Subcontractor's policy. Subcontractor's insurance shall also include an Insurer's waiver of subrogation in favor of Additional Insured's. Completed operations coverage shall extend a minimum of one year after final acceptance of the project by the Owner of such longer period as the Main Contract requires.

b. Subcontractor shall present current certificates of insurance and endorsements to Contractor prior to doing any work at the site and before any payment falls due. Those certificates of insurance shall be based on 25S Acord Form or equivalent and shall, together with appropriate endorsements, include the coverage described above and shall contain limits in the minimum amounts specified above. All insurance certificates shall also contain a provision that coverage afforded thereunder shall not be canceled or non-renewed, or restrictive modifications added, without thirty (30) days prior written notice to Contractor. The Certificates shall also delete any language which modifies or disclaims the Insurer's obligations to actually notify Contractor of any such cancellation, non-renewal, or modification. Such Certificates of Insurance and applicable endorsements required herein shall be in a form acceptable to Contractor and shall provide satisfactory evidence that Subcontractor has complied with all insurance requirements.

d. Property Insurance: If Builder's Risk or other property or equipment insurance is not provided by others under the Main Contract, the Subcontractor shall procure and maintain, at the Subcontractor's own expense, property and equipment insurance for portions of the Subcontract Work stored off the site or in transit. If Builder's Risk or other property insurance is provided by others, Contractor and Subcontractor waive all rights against each other and Owner, and agents or employees of any of them, separate contractors, and all other subcontractors for loss or damage to the extent covered by Builder's Risk or any other property or equipment insurance, except such rights as they may have to the proceeds of such insurance. Subcontractor shall be responsible for that portion of the Builder's Risk deductible which is proportionate to the loss or damage resulting from acts or omissions attributable to the Subcontractor.

e. Workers Compensation Insurance: Subcontractor shall procure, maintain and pay for Workers Compensation Insurance coverage under the laws of the state where the work is performed. Owner-operators are required to furnish Worker's Compensation certificates, notwithstanding any statutory exemptions. For states that do not require Worker's Compensation coverage, Owner/Operators shall elect into coverage under the Workers Compensation laws of the governing state. Owner/Operators shall file with the Industrial Insurance Commission a written declaration stating that the provisions of the Worker's Compensation laws shall apply to it and its surety. The effective date of such coverage shall be the date of commencement of work under this Subcontract. Owner/Operators shall make all payments as they become due and shall furnish evidence satisfactory to Contractor of the same. Should Owner/Operator choose to revoke its election of coverage, fail to furnish satisfactory evidence of payment, or fail to elect into Worker's Compensation coverage, payments for the same shall be deducted from the Subcontract amount or from monthly progress payments, due the Subcontractor at Contractor's sole election.

f. Failure to Pay or Maintain: If Subcontractor fails to secure and/or pay the premiums for any of the policies of insurance required herein, or fails to maintain such insurance, Contractor may, in addition to any other rights it may have under this Agreement or at law or in equity, terminate this subcontract or secure such policies or policies of insurance for the account of Subcontractor and charge Subcontractor for the premiums paid therefore, or withhold the amount thereof from sums otherwise



due from Contractor to subcontractor. Neither the Contractor's rights to secure such policy or policies nor the securing thereof by Contractor shall constitute an undertaking by Contractor on behalf of or for the benefit of Subcontractor or others to determine or warrant that such policies are in effect.

g. Indemnification: Subcontractor shall indemnify, hold harmless and defend Contractor and Owner as provided in Appendix 1.

Subcontractor Insurance Requirements

INSURANCE: Prior to the start of Subcontractor's work, Subcontractor shall procure and maintain in force for the duration, insurance coverages outlined below. Provide evidence of such coverage by submitting to the Contractor and prior to the start of the work, an appropriate Certificate of Insurance. The insurance carrier or carriers must be rated at least "A-" or better by A.M. Best or an acceptable State Fund for Workers Compensation coverage.

Workers Compensation: Copy of Contractors Exemption, if applicable must be submitted. Proof of coverage to be Provided in the following limits:

| | |
|-----------------------------|-------------------------------------|
| Workers Compensation- | Statutory |
| Employers Liability Limits- | \$1,000,000 Each Accident |
| | \$1,000,000 Disease – Policy Limit |
| | \$1,000,000 Disease – Each Employee |

Commercial General Liability Insurance: Including Premises & Operations, Personal & Advertising Injury, Blanket Contractual Liability (no restrictive endorsements such as CG 2139, CG 2294 or CG 2295) and Products and Completed Operations:

| | |
|---------|---|
| Limits: | \$1,000,000 Each Occurrence |
| | \$2,000,000 Products/Completed Operations Aggregate |
| | \$2,000,000 General Aggregate |

Chervenell Construction Company will be named as an "Additional Insured" including "Completed Operations Liability" and endorsed to your policy. The use of a combination of ISO CG 20 10 11/85 or CG 2010 & CG 2037 10/01 are acceptable or their blanket equivalent. If the Additional Insured Endorsement does not accompany the certificate of insurance, the certificate of insurance must list the form numbers/edition dates for the Additional Insured Endorsement being used and the actual Endorsement must be mailed when received. The Additional Insured Endorsement including Completed Operations is required to be maintained for 1 year after final acceptance of the project by the Owner or such longer period as the Main Contract requires.

Primary and noncontributory wording: Required

Blanket Waiver of Subrogation: Required

Per Project Aggregate Endorsement: Required

Professional Services Liability: ☐ Required (check block if required)

| | |
|---------|-----------------------------|
| Limits: | \$1,000,000 Each Occurrence |
| | \$2,000,000 Aggregate |

Pollution Legal Liability: ☐ Required (check block if required)

| | |
|---------|-----------------------------|
| Limits: | \$1,000,000 Each Occurrence |
| | \$2,000,000 Aggregate |

Automobile Liability:

| | | |
|---------|-------------------------------|------------------------------------|
| Limits: | \$1,000,000 CSL Each Accident | Owned Autos, Hired/Non Owned Autos |
|---------|-------------------------------|------------------------------------|

Umbrella/Excess Liability: \$1,000,000 Each Occurrence

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must be endorsed. If **SUBROGATION IS WAIVED**, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

| | | |
|--|--|-----------------------------|
| PRODUCER | CONTACT NAME: XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX | |
| XX | PHONE (A/C, No, Ext): XXX-XXX-XXXX | FAX (A/C, No): XXX-XXX-XXXX |
| XX | E-MAIL ADDRESS: | |
| XX | | |
| | INSURER(S) AFFORDING COVERAGE | NAIC # |
| INSURED | INSURER A :XXX | XXXXX |
| XX | INSURER B :XXX | XXXXX |
| XX | INSURER C :XXX | XXXXX |
| XX | INSURER D :XXX | XXXXX |
| XX | INSURER E :XXX | |
| | INSURER F : | |

COVERAGES

CERTIFICATE NUMBER: SAMPLE

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | | TYPE OF INSURANCE | | ADDL INSD | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS | | | |
|----------|---|--|---|-------------------------------------|-------------|--|-------------------------|-------------------------|---|---------------------------------|-----------------------------|--------------|
| X | <input checked="" type="checkbox"/> | COMMERCIAL GENERAL LIABILITY | | X | Y | XXXXXXXXXXXXXXXXXXXXXXXXXXXX | XX/XX/XXXX | XX/XX/XXXX | EACH OCCURRENCE | \$ 1,000,000 | | |
| | <input type="checkbox"/> | CLAIMS-MADE | <input checked="" type="checkbox"/> OCCUR | | | | | | DAMAGE TO RENTED PREMISES (Ea occurrence) | \$ 100,000 | | |
| | <input type="checkbox"/> | | | | | | | | MED EXP (Any one person) | \$ 5,000 | | |
| | GEN'L AGGREGATE LIMIT APPLIES PER: | | PERSONAL & ADV INJURY | | | | | | \$ 1,000,000 | | | |
| | <input type="checkbox"/> POLICY | <input checked="" type="checkbox"/> PRO-JECT | <input type="checkbox"/> LOC | | | | | | GENERAL AGGREGATE | \$ 2,000,000 | | |
| | | OTHER: | | | | | | PRODUCTS - COMP/OP AGG | \$ 2,000,000 | | | |
| | | | | | | | | | | \$ | | |
| X | <input checked="" type="checkbox"/> | AUTOMOBILE LIABILITY | | X | Y | XXXXXXXXXXXXXXXXXXXXXXXXXXXX SAMPLE | XX/XX/XXXX | XX/XX/XXXX | COMBINED SINGLE LIMIT (Ea accident) | \$ 1,000,000 | | |
| | <input checked="" type="checkbox"/> | ANY AUTO ALL OWNED AUTOS | <input type="checkbox"/> SCHEDULED AUTOS | | | | | | BODILY INJURY (Per person) | \$ | | |
| | <input checked="" type="checkbox"/> | HIRED AUTOS | <input checked="" type="checkbox"/> NON-OWNED AUTOS | | | | | | BODILY INJURY (Per accident) | \$ | | |
| | | | | | | | | | PROPERTY DAMAGE (Per accident) | \$ | | |
| | | | | | | | | | | \$ | | |
| X | <input checked="" type="checkbox"/> | UMBRELLA LIAB | | <input checked="" type="checkbox"/> | OCCUR | XXXXXXXXXXXXXXXXXXXXXXXXXXXX | XX/XX/XXXX | XX/XX/XXXX | EACH OCCURRENCE | \$ 1,000,000 | | |
| | <input type="checkbox"/> | EXCESS LIAB | | <input type="checkbox"/> | CLAIMS-MADE | | | | AGGREGATE | \$ 1,000,000 | | |
| | DED <input checked="" type="checkbox"/> | | RETENTION \$ XXXXXXX | | | | | | \$ | | | |
| X | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY | | | Y/N | N/A | XXXXXXXXXXXXXXXXXXXXXXXXXXXX | XX/XX/XXXX | XX/XX/XXXX | <input checked="" type="checkbox"/> PER STATUTE | <input type="checkbox"/> OTH-ER | | |
| | ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) | | | | | | | | | | E.L. EACH ACCIDENT | \$ 1,000,000 |
| | If yes, describe under DESCRIPTION OF OPERATIONS below | | | | | | | | | | E.L. DISEASE - EA EMPLOYEE | \$ 1,000,000 |
| | | | | | | | | | | | E.L. DISEASE - POLICY LIMIT | \$ 1,000,000 |
| | | | | | | | | | | | | |
| X | Installation Floater | | | | | XXXXXXXXXXXXXXXXXXXXXXXXXXXX | XX/XX/XXXX | XX/XX/XXXX | Limit | \$XXXXXXX | | |
| | | | | | | | | | Deductible | \$XXXXXXX | | |

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required) | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

Chervenell Construction Co is an additional insured. Policy forms included: Blanket Additional Insured with Completed Operations-CG8583 0413, GL Extension with Primary & Noncontributory and Waiver of Subrogation-CG8810 0413, Each Location Aggregate-CG8860 1208

CERTIFICATE HOLDER

Chervenell Construction Comapny
7511 W Arrowhead Ave Suite B
Kennewick, WA 99336

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – (FORM B)**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART.

SCHEDULE

Name of Person or Organization:

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

WHO IS AN INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of "your work" for that insured by or for you.

POLICY NUMBER:

SAMPLE FORM
COMMERCIAL GENERAL LIABILITY
CG 20 10 10 01

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – SCHEDULED PERSON OR
ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name of Person or Organization:

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

A. Section II – Who Is An Insured is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of your ongoing operations performed for that insured.

B. With respect to the insurance afforded to these additional insureds, the following exclusion is added:

2. Exclusions

This insurance does not apply to "bodily injury" or "property damage" occurring after:

- (1) All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the site of the covered operations has been completed; or
- (2) That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

POLICY NUMBER:

SAMPLE FORM
COMMERCIAL GENERAL LIABILITY
CG 20 37 10 01

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR
CONTRACTORS – COMPLETED OPERATIONS**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

| |
|--|
| Name of Person or Organization: |
| Location And Description of Completed Operations: |
| Additional Premium: |

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

Section II – Who Is An Insured is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of "your work" at the location designated and described in the schedule of this endorsement performed for that insured and included in the "products-completed operations hazard".

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 24 04 05 09

Insured:

**WAIVER OF TRANSFER OF RIGHTS OF RECOVERY
AGAINST OTHERS TO US**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE

Name of Person or Organization

Any person or organization that you have agreed in writing in a contract or agreement to waive any right of recovery against such person or organization, but only if the contract or agreement:

1. Is in effect or becomes effective during the term of this policy and;
2. Was executed prior to loss.

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

The following is added to Paragraph 8. **Transfer of Rights of Recovery Against Others To Us** of Section IV – **Conditions**:

We waive any right of recovery we may have against the person or organization shown in the Schedule above because of payment we make for injury or damage arising out of your ongoing operations or "your work" done under a written contract with that person or organization and included in the "products-completed operations hazard." This waiver applies only to the person or organization shown in the Schedule above.

SAMPLE FORM

POLICY NUMBER:
NAMED INSURED:

COMMERCIAL GENERAL LIABILITY
CG 25 03 03 97

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**DESIGNATED CONSTRUCTION PROJECT (S)
GENERAL AGGREGATE LIMIT**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Designated Construction Project (s):

*Any Construction Project in Which the Named
Insured is Involved Within the Policy Territory.*

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

- A. For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under COVERAGE A (SECTION I), and for all medical expenses caused by accidents under COVERAGE C (SECTION I), which can be attributed only to ongoing operations at a single designated construction project shown in the Schedule above:
1. A separate Designated Construction Project General Aggregate Limit applies to each designated construction project, and that limit is equal to the amount of the General Aggregate Limit shown in the Declarations.
 2. The Designated Construction Project General Aggregate Limit is the most we will pay for the sum of all damages under COVERAGE A, except damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard", and for medical expenses under COVERAGE C regardless of the number of:
 - a. Insureds;
 - b. Claims made or "suits" brought; or
 - c. Persons or organizations making claims or bringing "suits".
 3. Any payments made under COVERAGE A for damages or under COVERAGE C for medical expenses shall reduce the Designated Construction Project General Aggregate Limit for that designated construction project. Such payments shall not reduce the General Aggregate Limit shown in the Declarations nor shall they reduce any other Designated Construction Project General Aggregate Limit for any other designated construction project shown in the Schedule above.

4. The limits shown in the Declarations for Each Occurrence, Fire Damage and Medical Expense continue to apply. However, instead of being subject to the General Aggregate Limit shown in the Declarations, such limits will be subject to the applicable Designated Construction Project General Aggregate Limit.
- B. For all sums which the insured becomes legally obligated to pay as damages caused by "occurrence" under COVERAGE A (SECTION I), and for all medical expenses caused by accidents under COVERAGE C (SECTION I), which cannot be attributed only to ongoing operations at a single designated construction project shown in the schedule above:
1. Any payments made under COVERAGE A for damages or under COVERAGE C for medical expenses shall reduce the amount available under the General Aggregate Limit or the Products-Completed Operations Aggregate Limit, whichever is applicable; and
 2. Such payments shall not reduce any Designated Construction Project General Aggregate Limit.
- C. When coverage for liability arising out of the "products-completed operations hazard" is provided, any payments for damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard" will reduce the Products-Completed Operations Aggregate Limit, and not reduce the General Aggregate Limit nor the Designated Construction Project General Aggregate Limit.
- D. If the applicable designated construction project has been abandoned, delayed, or abandoned and then restarted, or if the authorized contracting parties deviate from the plans, blueprints, designs, specifications or timetables, the project will still be deemed to be the same construction project.
- E. The provisions of Limits Of Insurance (SECTION III) not otherwise modified by this endorsement shall continue to apply as stipulated.

SAMPLE FORM

POLICY NUMBER:

COMMERCIAL AUTO

CA 20 48 10 13

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

DESIGNATED INSURED FOR COVERED AUTOS LIABILITY COVERAGE

This endorsement modifies insurance provided under the following:

AUTO DEALERS COVERAGE FORM

BUSINESS AUTO COVERAGE FORM

MOTOR CARRIER COVERAGE FORM

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by this endorsement.

This endorsement identifies person(s) or organization(s) who are "insureds" for Covered Autos Liability Coverage under the Who Is An Insured provision of the Coverage Form. This endorsement does not alter coverage provided in the Coverage Form.

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Named Insured:

Endorsement Effective Date:

SCHEDULE

Name Of Person(s) Or Organization(s):

Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

Each person or organization shown in the Schedule is an "insured" for Covered Autos Liability Coverage, but only to the extent that person or organization qualifies as an "insured" under the Who Is An Insured provision contained in Paragraph A.1. of Section II - Covered Autos Liability Coverage in the Business Auto and Motor Carrier Coverage Forms and Paragraph D.2. of Section I - Covered Autos Coverages of the Auto Dealers Coverage Form.

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SAMPLE FORM

WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY INSURANCE POLICY

WC 00 03 13

(Ed. 4-84)

WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. (This agreement applies only to the extent that you perform work under a written contract that requires you to obtain this agreement from us.)

This agreement shall not operate directly or indirectly to benefit anyone not named in the schedule.

Schedule

ANY PERSON OR ORGANIZATION ON WHOSE BEHALF YOU ARE REQUIRED TO OBTAIN THIS WAIVER OF OUR RIGHT TO RECOVER FROM UNDER A WRITTEN CONTRACT OR AGREEMENT.

This endorsement changes the policy to which it is attached effective on the inception date of the issued unless otherwise stated.

Endorsement Effective 01/01/2010 **Policy No.** 4103105151 **Endorsement No.**

Insured Commercial Roofers, Inc.

Insurance Company Valley Forge Insurance Company

Authorized Representative

WC 00 03 13

(Ed. 4-84)

SUBCONTRACTOR PAYMENT BOND

Bond No.:

KNOW ALL BY THESE PRESENTS, That we, (subcontractor's name), called the Principal, and (surety's name), a (state) corporation, called the Surety, are held and firmly bound unto (Here insert the name and address, or legal title of the General Contractor), hereinafter called the Obligee, in the sum of U.S. Dollars (\$) (the "Penal Sum"), for the payment whereof said Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein.

WHEREAS, the Principal has entered into a subcontract numbered with the Obligee, dated , for project ("Subcontract").

NOW, THEREFORE, the conditions of this obligation are such that if the Principal shall promptly make payment to all Claimants as hereinafter defined for all labor and material used, consumed or incorporated in the performance of the construction work to be performed under the Subcontract, then this obligation shall be void; otherwise to remain in full force and effect, subject, however, to the following conditions:

1. A Claimant is defined as one other than the Obligee having a contract with the Principal or with a direct subcontractor of the Principal to supply labor and/or materials and such labor and/or materials are actually used, consumed or incorporated in the performance of the construction work under the Subcontract.

2. The above-named Principal and Surety hereby jointly and severally agree with the Obligee that every Claimant as herein defined who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's work or labor was done or performed or materials were furnished by such Claimant, may bring suit on this bond, prosecute the suit to final judgment for the amount due under Claimant's contract for the labor and/or materials supplied by the Claimant which were used, consumed or incorporated in the performance of the work, and have execution thereon; provided, however, that a Claimant having a direct contractual relationship with a direct subcontractor of the Principal shall have a right of action on this bond only if said Claimant notifies the Principal and Surety in writing of its claim within ninety (90) days from the date on which said Claimant did or performed the last labor and/or materials for which the claim is made. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal and Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the project is located, save that such service need not be made by a public officer.

3. No suit or action or arbitration shall be commenced hereunder by any Claimant:

a. After the expiration of the earlier of: (1) one year after the day on which the Claimant last supplied the labor and/or materials for which the claim is made; or (2) the limitation period set forth in the public works bond statutes, if any, in the location where the construction work is being performed. Any limitation contained in this bond which is prohibited by any law controlling in the state where the suit is filed shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by the law of that state, and said period of limitation shall be deemed to have accrued and shall commence to run on the day the Claimant last supplied the labor and/or materials for which the claim is made; and

SUBCONTRACT PERFORMANCE BOND

Bond No.:

KNOW ALL BY THESE PRESENTS: That [name of subcontractor], a [state] corporation, as Principal, hereinafter called Principal, and [name of surety], a [state] corporation, as Surety, hereinafter called Surety, are held and firmly bound unto [name of contractor], as Oblige, hereinafter called Oblige, in the amount of U.S. Dollars (\$) (the "Penal Sum"), for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated entered into a subcontract number with Oblige for the performance of subcontract work , including warranty obligations, in accordance with drawings and specifications for the construction of the project (hereinafter "the Project"), which subcontract is by reference made a part hereof, and is hereinafter referred to as the "Subcontract".

A. NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are such that, if Principal shall promptly and faithfully perform said Subcontract, then this obligation shall be null and void; otherwise it shall remain in full force and effect, subject to the following conditions: (i) Principal is in default under the Subcontract; and (ii) Principal has been declared by Oblige to be in default under the Subcontract; and (iii) the Oblige has performed its obligations under the Subcontract. Upon the occurrence of each of the above conditions, Surety shall have 30 days ("Investigatory Period") from the last event to occur of the following: (a) receipt of the written notice of default; (b) the date access to the Project site is provided to Surety; or (c) the date the information and documentation in Oblige's or its agent's possession and requested by Surety is received by the Surety, which information and documentation must be requested by Surety within 10 days of its receipt of Oblige's written notice of default, to:

- (1) Notify Oblige that it has elected to complete the Subcontract through independent contractor(s) retained by Surety and thereafter commence such performance with reasonable promptness. In such event, that portion of the Balance of the Subcontract Price as may be required to complete the Subcontract or remedy the default and to reimburse the Surety for its expenditures shall be paid to the Surety at the times and in the manner as said sums would have been payable to Principal had there been no default under the Subcontract; or
- (2) Notify the Oblige that it has elected to arrange for a subcontract between Oblige and a replacement subcontractor reasonably acceptable to Oblige guaranteed by subcontract performance and payment bonds provided by the replacement subcontractor in the amount of the replacement subcontract. In such event, Surety shall pay Oblige the difference between the cost of the replacement subcontractor and the amount that would have been payable to the Principal had there been no default under the Subcontract. Such payments may be in a lump sum (in the case of a lump sum subcontract) or periodically as incurred by Oblige; or
- (3) Request that Oblige complete the Subcontract. In such event, Surety shall pay Oblige the difference between the reasonable cost of a replacement subcontractor and the amount that would have been payable to the Principal had there been no default under the Subcontract; or
- (4) Arrange to provide financial and/or other assistance to the Principal ("Financing") to assist the Principal with completion of the Subcontract. In the event Oblige has formally terminated Principal's right to proceed under the Subcontract, this option shall be subject to Oblige's concurrence, which shall not be unreasonably withheld. The Oblige shall pay the Balance of the Subcontract Price as directed by the Surety. In the event Surety provides Financing, Surety, in its sole discretion, may upon written notice to Oblige cease providing such Financing at any time, in which event Surety shall immediately make a further election without a further Investigatory Period under this paragraph A; or
- (5) Deny liability and notify the Oblige, citing the reasons therefor; or
- (6) After investigation, determine the amount for which it may be liable to the Oblige and, as soon as practicable after the amount is determined, make payment to the Oblige.

B. After Oblige has provided Surety with written notice of the Principal's default, and during the Investigatory Period and any subsequent period before the commencement of work under paragraph A, subparagraphs 1 or 2, Oblige may take action pursuant to its Subcontract rights to mitigate the damages caused by the

Principal's default. To the extent that Obligor performs obligations under the Subcontract during this period (the "Mitigation Work") Obligor shall be entitled to deduct the Cost of the Mitigation Work from the Balance of the Subcontract Price. To the extent the Balance of the Subcontract Price is exhausted, and Surety elects to proceed under paragraph A, subparagraphs 1, 2, 3 or 4, Surety shall reimburse Obligor for the difference between the Balance of the Subcontract Price and the Cost of the Mitigation Work incurred and paid by Obligor.

- C. If Surety proceeds under paragraph A, subparagraphs 1, 2, 3, 4 or 6, Surety may additionally advise in its notice of its election to Obligor that the Obligor's claim is disputed as to liability and/or amount and Surety is proceeding under a reservation of all rights and defenses. In that event, Surety shall make all payments otherwise called for under this Bond. However, in the event it is determined that Surety is not liable, in whole or in part, under this Bond and Surety expended monies in excess of the funds paid by Obligor to Surety, then Surety shall be entitled to recover the excess from Obligor.
- D. The Surety's aggregate liability is limited to the Penal Sum of this Bond, regardless of whether the liability arises from the actions or failure to act of Principal or Surety. All amounts expended by the Surety under paragraphs A and/or B and/or C of this Bond, in excess of funds paid by Obligor to Surety, shall be credited against the Penal Sum. However, in the event it is determined that Surety expended monies in excess of the Penal Sum of this Bond, then Surety shall be entitled to recover the excess from Obligor. The Penal Sum of this Bond shall automatically be increased or decreased by the amount of any change order, provided the change order(s) do not, either singly or in the aggregate, exceed 10% of the original Subcontract amount. Should any change order singly or in the aggregate exceed 10% of the original Subcontract amount, Surety's written consent must be obtained by Obligor in order to increase the penal sum.
- E. Definitions:
 - (1) The term "Balance of the Subcontract Price," as used in this Bond, shall mean the total amount payable by Obligor to Principal under the Subcontract and any amendments thereto, less the amounts heretofore properly paid by Obligor under the Subcontract.
 - (2) The term "Cost of the Mitigation Work" means the cost actually incurred by Obligor in proper performance of work under the Subcontract, including remedying defects in the work of the Principal. Such costs shall be at rates and hours not higher than the standard customarily incurred at the place of the Project except with the prior written consent of the Surety. Obligor's overhead (both field and home office) as well as profit shall be included in the Cost of the Mitigation Work at a markup of 15% to the actual labor, material, equipment, and subcontractor costs incurred and paid for by Obligor. Obligor shall not apply markup to the cost of any subcontractor that is affiliated with Obligor.
- F. Notwithstanding any provision in this Bond and any document incorporated herein to the contrary, any proceeding, legal or equitable, under this Bond must be instituted in a court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of default or within two years after the Principal ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
- G. No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Obligor named herein or the heirs, executors, administrators or successors of the Obligor.
- H. Any notice given or any demand made under this Bond shall be given in writing and may be provided to the following email address _____ or given by any method of delivery that provides evidence or confirmation of receipt, including personal delivery, express courier (such as Federal Express), and prepaid certified or registered mail with return receipt requested. The Surety's address for notice is _____.
- I. The Surety shall not be liable to the Obligor or others for obligations of the Principal that are unrelated to the Subcontract work, and the Balance of the Subcontract Price shall not be reduced or set off on account of any such unrelated obligations.

J. The Surety hereby waives notice of change, including changes of time, to the Subcontract, purchase orders or other obligations.

Signed this day of , .

(Principal)

By: _____

(Surety)

By: _____
_____, Attorney-in-Fact

Bond No. _____
Contract No. _____

RETAINAGE BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____, a corporation existing under and by virtue of the laws of the State of Washington and authorized to do business in the State of Washington, as Principal, and _____, _____, a corporation organized and existing under the laws of the State of _____ and authorized to transact the business of surety in the State of Washington, as Surety, are jointly and severally held and bound unto _____ Company, hereinafter called _____ and the State Of Washington, hereinafter called State, as Obligee, and are similarly held and bound unto the beneficiaries of the trust fund created by RCW 60.28 as their heirs, executors, administrators, successors and assigns, in the penal sum of _____ (\$_____) plus 5% of any increases in the contract amount that have occurred or may occur, due to change orders, increases in the quantities or the addition of any new item of work.

WHEREAS, on the ____ day of _____, the said Principal herein entered in to _____, Contract No. _____ for work under Contract No. _____.

WHEREAS, said contract and RCW 60.28 require _____ to withhold from the Principal the sum of 5% from monies earned by the Principal on estimates during the progress of the work, hereinafter referred to as earned retained funds.

WHEREAS, the Principal has requested that _____ accept a bond in lieu of earned retained funds as allowed under Chapter 60.28 RCW.

NOW THEREFORE, this obligation is such that the Surety, its successors, and assigns are held and bound unto _____ and the State and unto all beneficiaries of the trust fund created by RCW 60.28.011(1) in the aforesaid sum. This bond, including any proceeds therefrom, is subject to all claims and liens and in the same manner and priority as set forth for retained percentages in Chapter 60.28 RCW. The condition of this obligation is also that if the Principal shall satisfy all payment obligations to persons who may lawfully claim under the trust fund created pursuant to Chapter 60.28 RCW, to _____ and the State, and indemnify and hold _____ and the State harmless from any and all loss, costs, and damages that and the State may sustain by release of said retainage to Principal, then this obligation shall be null and void, provided the Surety is notified by _____ that the requirements of RCW 60.28.021 have been satisfied and the obligation is duly released by _____ and the State.

IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable under this obligation as Principal. The Surety will not be discharged or released from liability for any act, omission or defenses of any kind or nature that would not also discharge the Principal.

IT IS HEREBY FURTHER DECLARED AND AGREED that this obligation shall be binding upon and inure to the benefit of the Principal, the Surety, _____, the State, the beneficiaries of the trust fund created by Chapter 60.28, Revised Code of Washington (RCW) and their respective heirs, executors, administrators, successors and assigns

IN WITNESS WHEREOF, said Principal and said Surety have caused these presents to be duly signed and sealed this ____ day of _____, 20__.

GC/CM Contractor

Prime Sub-Contractor

By _____
Principal

By _____
Principal

Address: _____

Address: _____

City/Zip: _____

City/Zip: _____

Phone: _____

Phone: _____

Bonding Company

By _____
Attorney-In-Fact

Address: _____

City/Zip: _____

Phone: _____

GCCM retainage bond

SCOPE OF SERVICES FOR MASTER BID PACKAGE

SECTION: Standard Inclusions to be included in all Bid Packages

Fran Rish Stadium Improvements

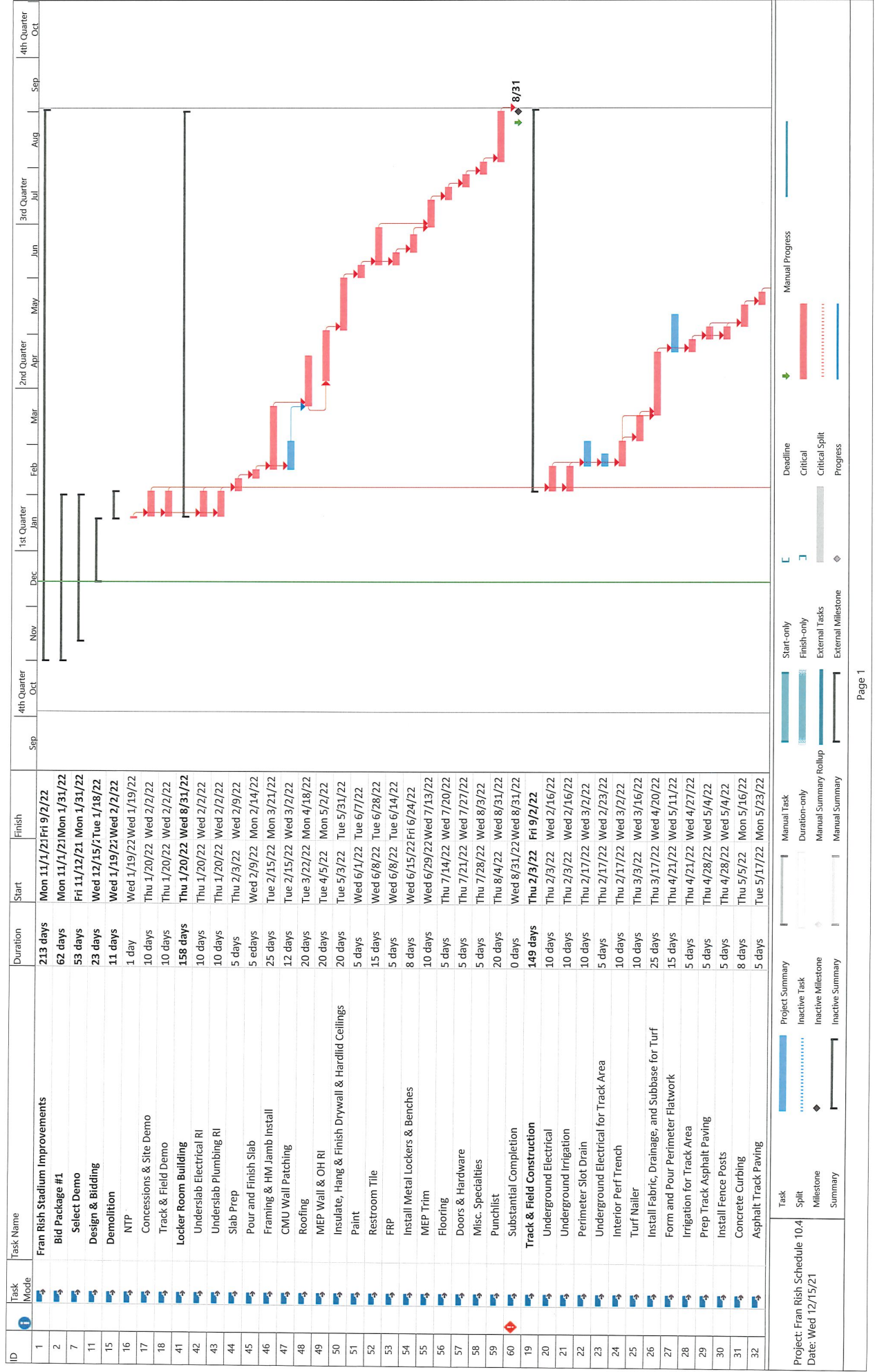
Sections

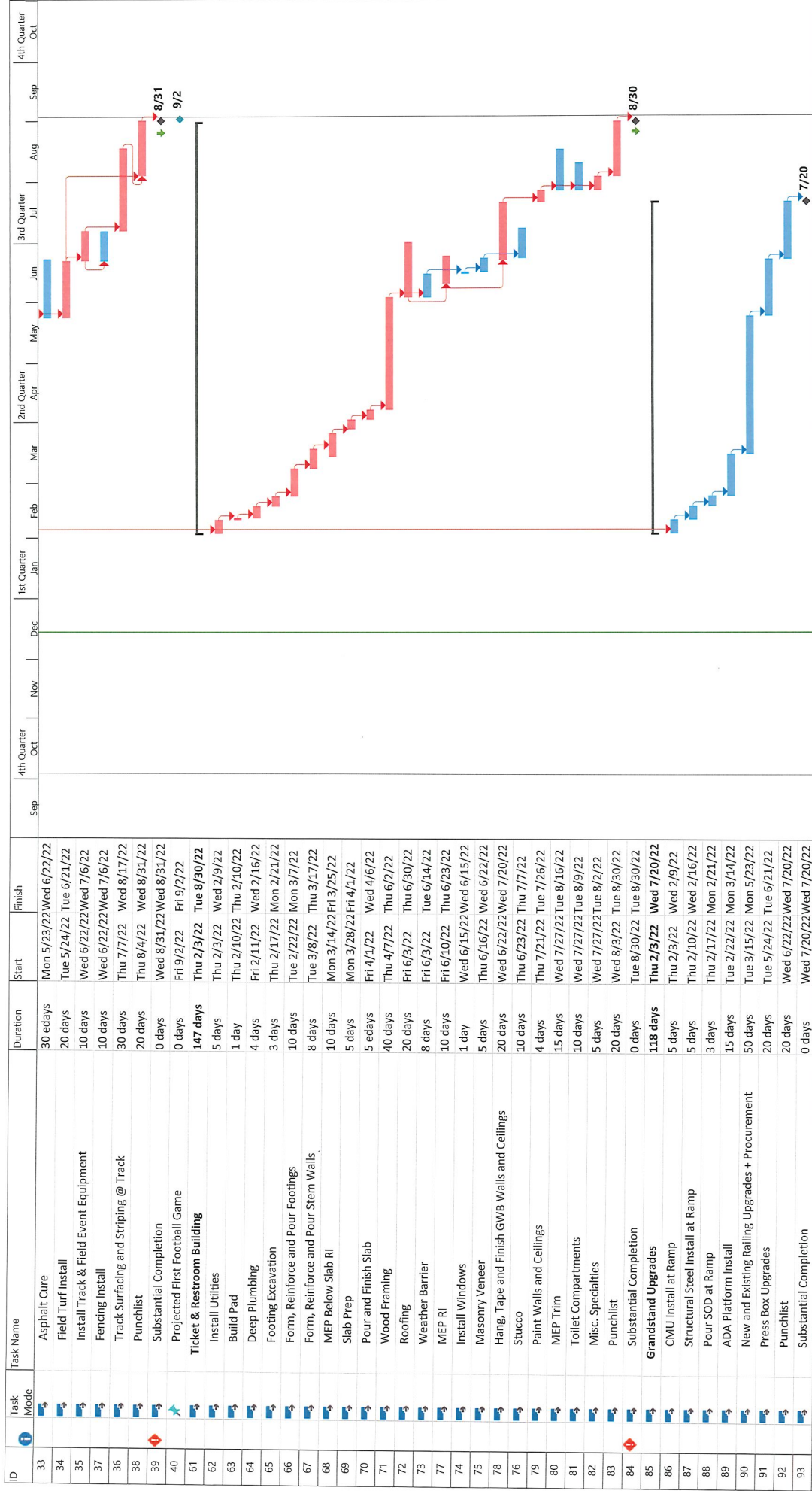
Division 01 – General Requirements – Complete

1. Project site will run on a five day per week, 8-hour per day schedule. All subcontractors are required to work this shift schedule. Any variation from that shift schedule requires written approval by Chervenell in advance of changing shifts.
2. As applicable, subcontractor is responsible for manlift protection on exposed concrete slabs. Diapers for lifts are recommended.
3. Subcontractors are to provide the necessary cleanup at the end of each shift to keep the jobsite clean of debris and generated trash and scraps that can be disposed of in dumpster provided by General Contractor.
 - a. Bid Packages 11 and 15 will be required to clean, dispose, and remove generated debris offsite in dumpster NOT provided by General Contractor.
4. It will be expected that pricing submitted on bid packages be held for a minimum of 30 days to allow for enough time during the contract process.
5. Subcontractor to provide schedule input to the General Contractor. Microsoft Project is recommended but not required.

Chervenell Construction to provide

- Temporary Fence
- Portable toilet with hand wash station
- General Contractor job trailer
- Chervenell to hold SWPP permit. Bid Package #2 to obey by SWPP during scope of work





Project: Fran Rich Schedule 10.4

Date: Wed 12/15/21

Task

Split

Milestone

Summary

Project Summary

Inactive Task

Inactive Milestone

Inactive Summary

Manual Task

Duration-only

Manual Summary Rollup

Manual Summary

Start-only

Finish-only

External Tasks

External Milestone

Deadline

Critical

Critical Split

Progress

Manual Progress

DIVISION 01 – GENERAL REQUIREMENTS

| | | |
|------------------|--|----|
| Section 01 10 00 | Summary | 4 |
| Section 01 23 00 | Alternates | 3 |
| Section 01 26 00 | Contract Modification Procedures | 2 |
| Section 01 29 00 | Payment Procedures | 4 |
| Section 01 31 00 | Project Management & Coordination | 6 |
| Section 01 32 00 | Construction Progress Documentation | 7 |
| Section 01 33 00 | Submittal Procedures | 8 |
| Section 01 40 00 | Quality Requirements | 9 |
| Section 01 42 00 | References | 13 |
| Section 01 50 00 | Temporary Facilities & Controls | 6 |
| Section 01 60 00 | Product Requirements | 7 |
| Section 01 73 00 | Execution | 5 |
| Section 01 73 29 | Cutting & Patching | 3 |
| Section 01 74 19 | Construction Waste Management and Disposal | 4 |
| Section 01 77 00 | Closeout Procedures | 4 |
| Section 01 78 23 | Operation & Maintenance Data | 6 |
| Section 01 78 39 | Project Record Documents | 3 |
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| Section 01 91 13 | General Commissioning Requirements | 13 |

SECTION 01 10 00 – SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by the Contract Documents.
 - 2. Type of the Contract.
 - 3. Work phases.
 - 4. Work under other contracts.
 - 5. Products ordered in advance for assignment.
 - 6. Owner-furnished products.
 - 7. Use of premises.
 - 8. Owner's occupancy requirements.
 - 9. Work restrictions.
 - 10. Specification formats and conventions.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
 - 2. Reference Document A201 for Project Closeout and Final Completion requirements.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Richland School District; Teaching, Learning, and Administration Center
 - 1. Project Location: Richland, Washington
- B. Owner: Richland School District
 - 1. Owner's Representative: Caren Johnson
- C. Architect: Design West Architects
- D. Owner's Construction Manager: Dax Logsdon
- E. The Work consists of the following:
 - 1. The Work includes all labor and material to complete the work included in the Contract Documents for the project.
 - 2. **SOILS REPORT: GeoProfessional Innovation Geotechnical Engineering Evaluation (9 sheets) dated September 2, 2021, included in the drawing set, is hereby included in the contract requirements and the requirements and recommendations contained within the Soil Report shall be binding on all portions of work. Information shown elsewhere in the drawings and specifications that contain a more stringent requirement than the referenced Soils Report shall take precedence.**

1.3 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract.

1.4 WORK PHASES

- A. The Work shall be conducted in phases as defined in the Contractual Performance Schedule in section below.
- B. Before commencing Work of each phase, submit a schedule showing the sequence, commencement and completion dates, and move-out and -in dates of Owner's personnel for all phases of the Work.

1.5 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

1.6 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated in the documents. The Work includes providing support systems to receive Owner's equipment and making plumbing, mechanical, and electrical connections as might be required for specific Owner furnished products.
1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
 2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
 3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
 4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
 5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
 6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
 7. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
 8. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
 9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
 10. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
 11. Contractor shall install and otherwise incorporate Owner-furnished items into the Work.

1.7 USE OF PREMISES

- A. General: Contractor shall have use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited by:
1. Owner's right to perform work or to retain other contractors on portions of Project.
 2. Other limitations contained in articles below
 3. Contractual schedule restrictions for completion of portions of the work to allow Owner occupancy of portions of the project during the School Year.
- B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Limits: Confine constructions operations to comply with the requirements of the Contractual Schedule defined in the article(s) below.
 2. Owner Occupancy: Allow for Owner occupancy of Project site as defined below.
 3. Driveways and Entrances: Promptly repair any damage. Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - c. Schedule deliveries to minimize disruption to the Owner's operation of the surrounding school campus.

1.8 OWNER'S OCCUPANCY REQUIREMENTS

- A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.

2. Contractor shall obtain a Certificates of Occupancy as required from authorities having jurisdiction before Owner occupancy.
3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.9 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed during normal business working hours of 6:00 a.m. to 6:00 p.m., Monday through Friday, except as otherwise indicated.
 1. Early Morning and Late Evening Hours: restrictions in accordance with regulations by authorities having jurisdiction for restrictions on noisy work. Request permission from Owner and Authorities having Jurisdiction to work outside normal work hours
 2. Hours for Utility Shutdowns: Provide two weeks advance request and notice of intended utility shut downs during the time that the Owner is occupying the adjacent facilities. Minimize the duration of any utility outage that affects the Owner's facilities.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 1. Notify Architect and Owner not less than two weeks in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Owner's written permission.
- C. Smoking nor tobacco use is not permitted on School District's property at any time or place.
- D. Amplified music, such as radios, CD/MP3 players, is not permitted on the project site at any time.
- E. Any and all pets/animals are not permitted on the project site at any time.
- F. Drugs, alcohol, weapons are not permitted School District's property at any time or place.

1.10 DOCUMENTS AND SPECIFICATION FORMATS AND CONVENTIONS

- A. The Contract Documents, including the Drawings and Specifications, are complementary and what is required by one shall be binding as if required by all. Work shown or required by any portion of the contract documents shall be provided by the contractor.
- B. Organization of the Specifications and Drawing keynotes into divisions, sections and articles, and the arrangement and numbering of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by a trade. The General Contractor is solely responsible for assigning work among various subcontractors and trades; the General Contractor is ultimately responsible for all work under the contract.
- C. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "MasterFormat" numbering system.
 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- D. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.11 CONTRACTUAL PERFORMANCE SCHEDULE

- A. The contractor shall plan and execute the work, including any premium labor costs or special work scheduling, to comply with attaining substantial completion within:

1. **211 total consecutive calendar days (February 1, 2022 to August 31, 2022).** Commencement Date to be set with Notice to Proceed.
2. Initial and complete submittals shall be received no later than **120 days** after Notice to Proceed for review and comment. Failure to comply with this deadline shall constitute breach of contract and shall be subject to liquidated damages. All closeout submittals shall be processed to allow timely Project Final Completion shall be achieved within 30 consecutive calendar days following the issuance of Substantial Completion. Reference specification 01 77 00 and Document A201 for Project Closeout and Final Completion requirements.
3. Project Final Completion shall be achieved within 30 consecutive calendar days following the issuance of Substantial Completion. Reference Document A201 for Project Closeout and Final Completion requirements. Failure to comply with this deadline shall constitute breach of contract and shall be subject to liquidated damages.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. **Bid Alternate #1A: Grandstand Waterproof Coating Gridlines 1-4.** Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents.
 - 1. Base Bid: No waterproof coating applied to grandstands.
 - 2. Bid Alternate #1A: Complete all work included in the Architectural drawings and specifications to provide an exterior waterproof coating to all horizontal and vertical concrete surfaces of the grandstands, including stairs, from gridlines 1 through 4. Include removal and re-installation of all aluminum bench seating.
- B. **Bid Alternate #1B: Grandstand Waterproof Coating Gridlines 1-4.** Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents.
 - 1. Base Bid: No waterproof coating applied to grandstands.
 - 2. Bid Alternate #1B: Complete all work included in the Architectural drawings and specifications to provide an exterior waterproof coating to all horizontal and vertical concrete surfaces of the grandstands, including stairs, from gridlines 1 through 5. Include removal and re-installation of all aluminum bench seating.

- C. **Bid Alternate #2: Tensile Fabric Screen.** Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents
1. Base Bid: No tensile fabric screen or associated accent lighting.
 2. Bid Alternate #2: Complete all work included in the Architectural and Electrical drawings to provide a tensile fabric screens and colored LED accent lighting along portions of the south and east elevations of the grandstand structure.
- D. **Bid Alternate #3: Replace all Field Lighting Towers and Fixtures.** Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents.
1. Base Bid: No changes to existing field lighting towers or fixtures.
 2. Bid Alternate #3: Complete all work included in the Architectural and Electrical drawings to remove and replace field lighting towers and associated fixtures.
- E. **Bid Alternate #4a: RGB Pole Lighting.** Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents.
1. Base Bid: Provide no RGB accent lighting and related controls on field lighting poles.
 2. Bid Alternate #4a: Complete all work included in the Electrical drawings and specifications required to provide RGB accent lighting and related controls to all field lighting poles.
- F. **Bid Alternate #4b: Show Lighting.** Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents.
1. Base Bid: Provide no upgraded lighting control system for pre-programmed field lighting shows.
 2. Bid Alternate #4b: Complete all work included in the Electrical drawings and specifications required to provide the upgraded field lighting control system allowing for pre-programmed light shows during games.
- G. **Bid Alternate #4c: Grandstand RGB Lighting.** Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents.
1. Base Bid: Provide no RGB accent lighting and related controls fixtures illuminating the grandstands.
 2. Bid Alternate #4c: Complete all work included in the Electrical drawings and specifications required to provide RGB accent lighting and related controls to fixtures illuminating the grandstands.
- H. **Bid Alternate #5a: Replace Aluminum Bench Seating.** Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents.
1. Base Bid: No replacement of existing bleacher benches.
 2. Bid Alternate #5: Complete all work included in the Architectural drawings and specifications required to replace all existing aluminum bleacher bench seating with new aluminum benches.
- I. **Bid Alternate #5b: Aluminum Bench Seating Labor Credit if Bid Alternate #1A Accepted.** Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents.
1. Base Bid: No replacement of existing bleacher benches.
 2. Bid Alternate #5b: Provide labor credit for removal and installation of aluminum bench seating if Bid Alternate #1A is accepted.

- J. **Bid Alternate #5c: Aluminum Bench Seating Labor Credit if Bid Alternate #1B Accepted.**
Add all materials and labor required to provide the work shown on drawings and associated specifications, as identified in the Contract Documents.
1. Base Bid: No replacement of existing bleacher benches.
 2. Bid Alternate #5c: Provide labor credit for removal and installation of aluminum bench seating if Bid Alternate #1B is accepted.

END OF SECTION 01 23 00

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
 - 1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.2 MINOR CHANGES IN THE WORK

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

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.4 CHANGE ORDER PROCEDURES

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

1.5 CONSTRUCTION CHANGE DIRECTIVE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.
 - 3. [Division 01 Section "Demonstration and Training" for invoicing approval regarding Schedule of Value line items for Owner's Training.](#)

1.2 DEFINITIONS

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

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Contractor's Construction Schedule.
 - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Submit draft of AIA Document G703 Continuation Sheets.
 - 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project

- Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
 7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 8. Provide separate line items in the Schedule of Values for each division of work, separating material and labor costs under each division.
 9. Provide separate line item in the Schedule of Values for project closeout. Value of project closeout shall be 0.5% of the contract amount or \$10,000, whichever is greater.
 10. Provide separate line items in the Schedule of Values for Owner's Training in the amount listed below each for:
 - a. Lighting Controls - \$3,000
 - b. Automatic Temperature Controls - \$3,000
 - c. Fire Alarm - \$1,000
 - d. Intrusion and Access Control - \$1,000
 - e. Irrigation Controls - \$1,000Once training is complete and approved by Owner for each system, the above individual training line items in Schedule of Value can be invoiced. See specification 01 79 00.
 11. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 12. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
 13. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: The Owner's payment process "cut off dates" will be provided to the contractor. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- E. Payment Application Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included at end of this Section.
- F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders (and Construction Change Directives—if used) issued before last day of construction period covered by application.
- G. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Initial settlement survey and damage report if required.
 17. Labor and Industries required Intent to Pay Prevailing Wage statements.
- K. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing **97** percent completion for portion of the Work claimed as substantially complete.
 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificates of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Labor and Industries required Affidavit of Prevailing Wage Paid statements.
 10. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 - PROJECT MANAGEMENT & COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
 - 4. Requests for Interpretation (RFIs).
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.
- C. Related Sections include the following:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.2 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.3 COORDINATION

- A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
 - 5. Coordinate sequence and space requirements above the ceiling for lighting, power, telecommunications, fire alarm, fire sprinkler, plumbing and fire sprinkler lines. Provide all necessary support and coordination to allow installation of above ceiling utilities within the available space between structural members and the ceilings heights indicated in the drawings.
- B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various contractors having interdependent responsibilities for installing, connection to, and providing service, for such equipment
- C. Coordinate space requirements and concealed installation of mechanical and electrical work which are indicated diagrammatically on drawings. Following routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs
- D. In finished areas except as otherwise shown, conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements
- E. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- F. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
 9. Project closeout activities.
- G. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.4 SUBMITTALS

- A. Initial and complete submittals shall be received no later than **120 days** after the Notice to Proceed for review and comment. Failure to comply with this deadline shall constitute breach of contract, and shall be subject to liquidated damages.
- B. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
 1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequences.
 - 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. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Sheet Size: At least **8-1/2 by 11 inches** but no larger than **30 by 40 inches**.
 3. Number of Copies: Submit three copies of each submittal. Architect, will return one copy.
 - a. Electronic submittal copies to be considered. Final determination to be made at Pre-Construction meeting.
 4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
- C. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to full-time project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
1. Include special personnel required for coordination of operations with other contractors.
 2. General Superintendent – this individual will represent the general contractor primarily, and will be responsible for coordination of contractors, safety, technical aspects of the construction, maintenance of the schedule, generation of Requests for Information and similar duties. This individual will be responsible for pre-installation meetings, maintenance of as-built drawings, shop drawing and submittal coordination and distribution, monitoring and logging of site visits, and other functions typical of a Quality Control Officer. This position will also be responsible for coordination with subcontractors and vendors.
 3. Contractor's staff shall be responsible for computer generated (e-mail), phone, and fax, messages, job-site filing, correspondence, distribution of minutes, drafts of pay applications and generally ensures that the job office is staffed during the normal work week hours of operation.
 4. The contractor may distribute the duties among their personnel in any manner acceptable to the owner.
 5. The contractor must provide the name and phone number of a designated local employee or resident who is generally available evenings and weekends to respond to emergencies on the job-site. This is not an on-call position, but the phone number must be provided with an answering machine / voicemail to ensure a timely response.
 6. Inform Architect and Owner, in writing, of the name, address and telephone of the designated local employee.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within five days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner, and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
1. Architect/ Engineer will administer preconstruction conference for execution of Owner - Contractor Agreement, clarification of Owner and Contractor responsibilities in use of site, review of administrative procedures, and exchange of preliminary submittals
 2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.

- j. Submittal procedures.
 - k. Preparation of Record Documents.
 - l. Use of the premises and existing building.
 - m. Work restrictions.
 - n. Owner's occupancy requirements.
 - o. Responsibility for temporary facilities and controls.
 - p. Construction waste management and recycling.
 - q. Parking availability.
 - r. Office, work, and storage areas.
 - s. Equipment deliveries and priorities.
 - t. First aid.
 - u. Security.
 - v. Progress cleaning.
 - w. Working hours.
4. Minutes: Architect will record and distribute meeting minutes.
- C. Progress & Coordination Meetings: Conduct progress meetings at approximately weekly intervals. Coordinate dates of meetings with preparation of payment requests.
- 1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
 - 3. Minutes: Contractor shall Record the meeting minutes.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

- a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 - 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 - 3. Submit each RFI with the cover tracking transmittal form provided at the end of this section
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Contractor.
 - 4. Name of Architect.
 - 5. RFI number, numbered sequentially.
 - 6. Specification Section number and title and related paragraphs, as appropriate.
 - 7. Drawing number and detail references, as appropriate.
 - 8. Field dimensions and conditions, as appropriate.
 - 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 10. Contractor's signature.
 - 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs: Cover transmittal form at end of this Section.
 - 1. Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
 - 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 7 days of receipt of the RFI response.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Preliminary Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Submittals Schedule.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Field condition reports.
 - 7. Special reports.
- B. Related Sections include the following:
 - 1. Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
 - 2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 3. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
 - 4. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- H. Major Area: A story of construction, a separate building, or a similar significant construction element.
- I. Milestone: A key or critical point in time for reference or measurement.
- J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.
- K. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.3 SUBMITTALS

- A. Qualification Data: For scheduling consultant.
- B. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for Architect's final release or approval.
- C. Preliminary Construction Schedule: Submit two opaque copies.
 - 1. Approval of cost-loaded preliminary construction schedule will not constitute approval of Schedule of Values for cost-loaded activities.
- D. Preliminary Network Diagram: Submit two opaque copies, large enough to show entire network for entire construction period. Show logic ties for activities.
- E. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
 - 1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
- F. CPM Reports: Concurrent with CPM schedule, submit three copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - 3. Total Float Report: List of all activities sorted in ascending order of total float.
 - 4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- G. Daily Construction Reports: Allow Owner and Architect to review Daily Construction reports upon request.

1.4 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, area separations and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review time required for review of submittals and resubmittals.
 - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 8. Review time required for completion and startup procedures.
 - 9. Review and finalize list of construction activities to be included in schedule.
 - 10. Review submittal requirements and procedures.
 - 11. Review procedures for updating schedule.

1.5 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 2. Initial Submittal: Submit concurrently with preliminary network diagram. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - a. At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 4. Startup and Testing Time: Include not less than 14 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.

- d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 - 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
 - 8. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
 - E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion, and the interim milestones defined in Section 01 10 00.
 - F. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
 - 1. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
 - 2. Contractor shall assign cost to construction activities on the CPM schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Architect's approval, be assigned to fabrication and delivery activities. Costs shall be under required principal subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
 - 3. Each activity cost shall reflect an accurate value subject to approval by Architect.
 - 4. Total cost assigned to activities shall equal the total Contract Sum.
 - G. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
 - H. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.
- 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)
- A. General: Prepare network diagrams using AON (activity-on-node) format.
 - B. Preliminary Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
 - C. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 4. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and commissioning.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Principal events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the Schedule of Values).
- F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.
- G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (refer to special reports).
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Emergency procedures.
 13. Orders and requests of authorities having jurisdiction.
 14. Change Orders received and implemented.
 15. Construction Change Directives received and implemented.
 16. Services connected and disconnected.
 17. Equipment or system tests and startups.
 18. Partial Completions and occupancies.
 19. Substantial Completions authorized.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
 - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
 - 2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
 - 3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
 - 4. Division 01 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
 - 5. Division 01 Section "WSSP Certification Requirements" for submitting documentation to substantiate compliance with WSSP requirements for the project.
 - 6. Division 01 Section "Closeout Procedures" for submitting warranties.
 - 7. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 8. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 9. Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
 - 10. Divisions 02 through 33 Sections for specific requirements for submittals in those Sections.
- C. Initial and complete submittals shall be received no later than **120 days** after Notice to Proceed for review and comment. Failure to comply with this deadline shall constitute breach of contract, and shall be subject to liquidated damages. All submittals shall be processed to allow timely completion of all work within the time limits and deadlines defined in Section 01 10 00.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of

the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 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.
- E. Identification: Transmit all submittals using the submittal transmittal tracking form provided following this specification section. Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately **6 by 8 inches** on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- F. Deviations: Encircle or otherwise specifically identify deviations from the Contract Documents on submittals.
- G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
 2. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form provided at the end of this section. Architect will return submittals, without review received from sources other than Contractor.
1. Transmittal Form: Use facsimile of sample form at end of Section.
 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.

- J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
 - 1. Provide sign-off of each submittal by all affected sub-contractors
 - 2. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions
 - K. Use for Construction: Use only final submittals with mark indicating action taken by Architect.
- 1.4 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES
- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
 - 1. The recipient agrees, to the fullest extent permitted by law, to indemnify and hold harmless the Design Team, its officers, directors, employees and sub-consultants against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising from any changes made by anyone or from any reuse of the electronic files.
 - 2. Under no circumstances shall delivery of electronic files for use by the recipient be deemed a sale by the Design Team, and the Design Team makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall the Design Team be liable for indirect or consequential damages as a result of the Contractor's use or reuse of the electronic files

PART 2 - PRODUCTS

2.1 SUBMITTALS

- A. General: Prepare and submit Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 - 4. Submit Product Data before or concurrent with Samples.
 - 5. Number of Copies: Submit five copies of Product Data, unless otherwise indicated. Architect will return three copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.

- d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
- 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least **8-1/2 by 11 inches** but no larger than **30 by 40 inches**.
 - 3. Number of Copies: Submit three copies of each submittal, unless more copies are required for operation and maintenance manuals. Architect will retain one copy; one copy will be provided to the owner and the remainder copies will be returned to the Contractor. Mark up and retain returned copy as a Project Record Drawing.
 - a. Electronic submittal copies to be considered. Final determination to be made at Pre-Construction meeting.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
- 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 - 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 - 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample 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.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
 2. Number and name of room or space.
 3. Location within room or space.
 4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect, will return two copies.
 - a. Mark up and retain one returned copy as a Project Record Document.
- F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation" for Construction Manager's action.
- G. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- H. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- I. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
 4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated.
 - a. Mark up and retain one returned copy as a Project Record Document.
- 2.2 INFORMATIONAL SUBMITTALS
- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- M. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."
- N. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- O. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- P. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- R. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.

5. Required adjustments.
 6. Recommendations for cleaning and protection.
 - T. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
 - U. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
 - V. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.
 1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.
- 2.3 DELEGATED DESIGN
- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
 - B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

- 3.1 CONTRACTOR'S REVIEW
- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
 - B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
- 3.2 ARCHITECT'S ACTION
- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
 - B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.

- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 33 00

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Contractor to confirm at completion of construction that no known asbestos material or product was installed during construction. Contractor to complete and submit the last page of this section – Construction Material Asbestos Statement.
- C. Building Envelope Mock-Up
- D. Related Sections include the following:
 - 1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 3. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
 - J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- 1.3 CONFLICTING REQUIREMENTS
- A. In the event of a conflict or discrepancy among or in the Contract Documents, interpretation shall be governed in the following priority, with an Addendum or a revision to a Contract Document having precedence over the original document and later Addenda having precedence over earlier:
 - 1. Agreement (revised A101-2007) (written amendments having precedence)
 - 2. Any Supplementary Conditions
 - 3. These revised General Conditions (A201-2007)
 - 4. Addenda, with those of later date having precedence over those of earlier date
 - 5. Division 1 of the Specifications
 - 6. Drawings and Divisions 2 through 50 of the Specifications
 - 7. Material and systems schedules
 - 8. Other Documents specifically enumerated in the Agreement as part of the Contract Documents.
 - B. General: If there is an inconsistency in the Contract Drawings, or between the Contract Drawings and the Specifications, unless otherwise ordered in writing by the Architect or the Owner, the Contractor shall provide the better quality of, or the greater quantity of, work or materials regardless of cost to the Contractor, with no delay to the project schedule. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- 1.4 SUBMITTALS
- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
 - B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
 - C. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

- d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
- 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed, unless otherwise indicated.
- K. Special Building Envelope Mockup: Before installing portions of the Work involving the exterior building wall the Contractor shall construct a mockup complying with the following requirements using materials accepted through the submittal process:
 - 1. Construct a freestanding 8' wide x 12' long mockup representative of the finished building wall demonstrating the relationships and installation sequences of the various wall components. The mockup shall contain all of the building elements comprising the construction of the exterior building wall including, but not limited to, the following elements: weather barriers, air barrier, building finishes, windows, curtain wall, louvers, vents, wall panel system, electrical and plumbing penetrations, flashings and sealants. A portion of the mockup wall shall be constructed to show the interior wall insulation and vapor barrier installation.
 - 2. The mockup shall demonstrate the proposed range of aesthetic effects and workmanship.
 - 3. The mockup shall be located on site at a location determined by the Contractor to minimize disruption to other site activities. The mockup shall remain in place until the exterior building envelop work is reviewed and accepted (punch list completed). The mockup shall then be demolished and removed.
 - 4. The mockup shall be used as a standard for judging the completed work.
 - 5. In lieu of a free-standing mockup, at the Contractor's option, a portion of the building containing the required building elements may be designated as the mockup. If a portion of the building is designated as a mockup that area shall be maintained during construction in an undisturbed condition. The mockup shall remain in place until such time that the remainder of the building envelope is complete.
 - 6. The mockup shall be constructed to delineate the installation of the following three exterior phases of work:
 - A. Building sheathing installation (screw pattern attachment), weather barrier installation (including flashing of all typical wall penetrations) and installation of the work shown in the typical Exterior Openings Flashing detail shown in the drawings.
 - B. Installation of the masonry wall base flashing, mortar netting, weep holes, coursing/block types and metal flashing associated with wall openings.

- C. Installation of windows, louvers, wall panel system and remaining flashings and sealants.
- 7. The mockup shall not be constructed until the submittals for each portion of the work have been submitted and reviewed. For portions of the work requiring Pre-Construction meetings the Pre-Construction meeting shall occur prior to the construction of the mockup.
- 8. Submitted and reviewed samples for portions of the work, window samples for example, may be used in the freestanding mockup upon request of the Contractor.
- L. Asbestos
 - 1. The Contract Documents for this project have been prepared in accordance with generally accepted professional architectural and engineering practices. Accordingly, no asbestos or products containing asbestos have been knowingly specified for this project. Notify the Architect immediately for instruction if -
 - 2. Materials containing asbestos are brought to the site for inclusion in the Work.
 - 3. Asbestos materials are encountered in any existing structures upon which work is being performed.
 - 4. At Architect's direction and with owner's approval, an independent testing laboratory will perform testing procedures on suspect materials.
 - 5. Contractor shall certify that based upon his best knowledge, information, inspection and belief no building materials containing asbestos were used in the construction of the project. Submit certification on form provided by Owner. Sample form follows this section.

1.6 QUALITY CONTROL

- A. General Contractor Responsibilities:
 - 1. General Contractor shall maintain quality control over suppliers, manufacturers, products, services, site conditions and workmanship, to produce work of specified quality
 - 2. General Contractor shall provide certification that all construction is asbestos free at project closeout. Provide certification that all products and materials used are asbestos free.
 - 3. General Contractor and all Sub-Contractors shall comply with indicated tolerances except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship
 - 4. General Contractor and all subcontractors shall perform work by persons qualified to produce workmanship of specified quality. Inability to perform such work is a demonstration of lack of qualification
 - 5. Comply with manufacturer's instruction in full detail, including each step in sequence. Should instruction conflict with Contract Documents, request clarification from Manufacturer, and/or Architect/Engineer before proceeding
 - 6. When required by individual Specification Section, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements
 - 7. When respective Specification Sections and/or plans require manufacturers to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, manufacturer shall make appropriate recommendations. Submit written report to Architect/Engineer listing observations and recommendations
- B. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

- C. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. All testing shall be witnessed by Architect/Engineer and/or school district with 24-hour notification.
 - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service. Reports will be submitted to Architect/Engineer in duplicate or as required, non-conforming reports shall also be submitted to the school district.
 - 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Architect/Engineer and/or school district may issue non-conformance reports to the contractor covering apparent non-conformance with the requirements of the contract documents.
 - 1. Advise the Owner and/or Architect/Engineer when complete and ready for inspection:
 - a. Above ceiling
 - b. Finished areas
 - c. Finished exterior and sitework
 - d. Finished roof
- G. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- H. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Contractor shall coordinate with Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested
 - a. Notify Architect/Engineer and Testing Laboratory 24 hours prior to expected time for operations requiring testing services

- b. Make arraignments with Testing Laboratory and pay for additional samples and tests for Contractor's convenience
 - 2. Access to the Work.
 - 3. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 4. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 5. Facilities for storage and field curing of test samples.
 - 6. Delivery of samples to testing agencies.
 - 7. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 8. Security and protection for samples and for testing and inspecting equipment at Project site.
 - I. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
 - J. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.
 - 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
- 1.7 SPECIAL TESTS AND INSPECTIONS
- A. Special Tests and Inspections: Owner will engage a qualified testing agency, and/or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
 - B. Special Tests and Inspections: Conducted by a qualified testing agency, and/or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, with copy to Contractor and to authorities having jurisdiction.
 - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

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

3.2 CONSTRUCTION MATERIAL ASBESTOS STATEMENT

- A. Upon completion of construction, contractor shall submit the Construction Material Asbestos Statement.
 - 1. Complete and submit the last page of this section – Construction Material Asbestos Statement.

3.3 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Contractor shall respond to and/or correct apparent non-conformance with the contract documents as required within 48 hours or before work proceeds. Non-conformance affecting life or property shall be corrected immediately.
- C. Contractor shall notify school district Representative 24 hours before arriving on site to perform any correction or remedial work. Failure to notify the school district may jeopardize acceptance of such work.
- D. Protect construction exposed by or for quality-control service activities.
- E. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

CONSTRUCTION MATERIAL ASBESTOS STATEMENT

Building Name:

Building Address:

Building Owner:

Completion Date:

As GENERAL CONTRACTOR in charge of construction; based on my best knowledge, information, inspection and belief; I certify that on the above-referenced building no asbestos containing building materials were used in the construction.

Date

General Contractor in Charge

Company Name

END OF SECTION 01 40 00

SECTION 01 42 00 – REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

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| ADAAG | Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov | (800) 872-2253 (202) 272-0080 |
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| CFR | Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html | (866) 512-1800 (202) 512-1800 |
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| DOD | Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point | (215) 697-6257 |
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| ABAA | Air Barrier Association of America www.airbarrier.org | (866) 956-5888 |
| ABMA | American Bearing Manufacturers Association www.abma-dc.org | (202) 367-1155 |
| ACI | ACI International (American Concrete Institute) www.aci-int.org | (248) 848-3700 |
| ACPA | American Concrete Pipe Association www.concrete-pipe.org | (972) 506-7216 |
| AEIC | Association of Edison Illuminating Companies, Inc. (The) www.aeic.org | (205) 257-2530 |
| AF&PA | American Forest & Paper Association www.afandpa.org | (800) 878-8878 (202) 463-2700 |
| AGA | American Gas Association www.aga.org | (202) 824-7000 |
| AGC | Associated General Contractors of America (The) www.agc.org | (703) 548-3118 |
| AHAM | Association of Home Appliance Manufacturers www.aham.org | (202) 872-5955 |
| AI | Asphalt Institute www.asphaltinstitute.org | (859) 288-4960 |
| AIA | American Institute of Architects (The) www.aia.org | (800) 242-3837 (202) 626-7300 |
| AISC | American Institute of Steel Construction www.aisc.org | (800) 644-2400 (312) 670-2400 |
| AISI | American Iron and Steel Institute www.steel.org | (202) 452-7100 |
| AITC | American Institute of Timber Construction www.aitc-glulam.org | (303) 792-9559 |
| ALSC | American Lumber Standard Committee, Incorporated www.alsc.org | (301) 972-1700 |
| AMCA | Air Movement and Control Association International, Inc. www.amca.org | (847) 394-0150 |
| ANSI | American National Standards Institute www.ansi.org | (202) 293-8020 |
| AOSA | Association of Official Seed Analysts, Inc. www.aosaseed.com | (505) 522-1437 |
| APA | APA - The Engineered Wood Association www.apawood.org | (253) 565-6600 |
| APA | Architectural Precast Association www.archprecast.org | (239) 454-6989 |

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| API | American Petroleum Institute www.api.org | (202) 682-8000 |
| ARI | Air-Conditioning & Refrigeration Institute www.ari.org | (703) 524-8800 |
| ARMA | Asphalt Roofing Manufacturers Association www.asphaltroofing.org | (202) 207-0917 |
| ASCE | American Society of Civil Engineers www.asce.org | (800) 548-2723 (703) 295-6300 |
| ASHRAE | American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org | (800) 527-4723 (404) 636-8400 |
| ASME | ASME International (The American Society of Mechanical Engineers International) www.asme.org | (800) 843-2763 (973) 882-1170 |
| ASSE | American Society of Sanitary Engineering www.asse-plumbing.org | (440) 835-3040 |
| ASTM | ASTM International (American Society for Testing and Materials International) www.astm.org | (610) 832-9585 |
| AWCI | AWCI International (Association of the Wall and Ceiling Industry International) www.awci.org | (703) 534-8300 |
| AWCMA | American Window Covering Manufacturers Association (Now WCSC) | |
| AWI | Architectural Woodwork Institute www.awinet.org | (800) 449-8811 (703) 733-0600 |
| AWPA | American Wood-Preservers' Association www.awpa.com | (334) 874-9800 |
| AWS | American Welding Society www.aws.org | (800) 443-9353 (305) 443-9353 |
| AWWA | American Water Works Association www.awwa.org | (800) 926-7337 (303) 794-7711 |
| BHMA | Builders Hardware Manufacturers Association www.buildershardware.com | (212) 297-2122 |
| BIA | Brick Industry Association (The) www.bia.org | (703) 620-0010 |
| BICSI | BICSI www.bicsi.org | (800) 242-7405 (813) 979-1991 |
| BIFMA | BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com | (616) 285-3963 |
| BISSC | Baking Industry Sanitation Standards Committee www.bissc.org | (866) 342-4772 |

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| CCC | Carpet Cushion Council www.carpetcushion.org | (203) 637-1312 |
| CDA | Copper Development Association www.copper.org | (800) 232-3282 (212) 251-7200 |
| CEA | Canadian Electricity Association www.canelect.ca | (613) 230-9263 |
| CFFA | Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com | (216) 241-7333 |
| CGA | Compressed Gas Association www.cganet.com | (703) 788-2700 |
| CIMA | Cellulose Insulation Manufacturers Association www.cellulose.org | (888) 881-2462 (937) 222-2462 |
| CISCA | Ceilings & Interior Systems Construction Association www.cisca.org | (630) 584-1919 |
| CISPI | Cast Iron Soil Pipe Institute www.cispi.org | (423) 892-0137 |
| CLFMI | Chain Link Fence Manufacturers Institute www.chainlinkinfo.org | (301) 596-2583 |
| CPA | Composite Panel Association www.pbmdf.com | (301) 670-0604 |
| CPPA | Corrugated Polyethylene Pipe Association www.cppa-info.org | (800) 510-2772 (202) 462-9607 |
| CRI | Carpet & Rug Institute (The) www.carpet-rug.com | (800) 882-8846 (706) 278-3176 |
| CRSI | Concrete Reinforcing Steel Institute www.crsi.org | (847) 517-1200 |
| CSA | CSA International (Formerly: IAS - International Approval Services) www.csa-international.org | (866) 797-4272 (416) 747-4000 |
| CSI | Cast Stone Institute www.caststone.org | (770) 972-3011 |
| CSI | Construction Specifications Institute (The) www.csinet.org | (800) 689-2900 (703) 684-0300 |
| CSSB | Cedar Shake & Shingle Bureau www.cedarbureau.org | (604) 820-7700 |
| CTI | Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org | (281) 583-4087 |
| DHI | Door and Hardware Institute www.dhi.org | (703) 222-2010 |
| EIA | Electronic Industries Alliance www.eia.org | (703) 907-7500 |

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| EIMA | EIFS Industry Members Association www.eima.com | (800) 294-3462 (770) 968-7945 |
| EJCDC | Engineers Joint Contract Documents Committee www.ejdc.org | (703) 295-5000 |
| EJMA | Expansion Joint Manufacturers Association, Inc. www.ejma.org | (914) 332-0040 |
| ESD | ESD Association www.esda.org | (315) 339-6937 |
| FMG | FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com | (401) 275-3000 |
| FSA | Fluid Sealing Association www.fluidsealing.com | (610) 971-4850 |
| FSC | Forest Stewardship Council www.fsc.org | 49 228 367 66 0 |
| GA | Gypsum Association www.gypsum.org | (202) 289-5440 |
| GANA | Glass Association of North America www.glasswebsite.com | (785) 271-0208 |
| GS | Green Seal www.greenseal.org | (202) 872-6400 |
| GSI | Geosynthetic Institute www.geosynthetic-institute.org | (610) 522-8440 |
| HI | Hydraulic Institute www.pumps.org | (888) 786-7744 (973) 267-9700 |
| HI | Hydronics Institute www.gamanet.org | (908) 464-8200 |
| HPVA | Hardwood Plywood & Veneer Association www.hpva.org | (703) 435-2900 |
| HPW | H. P. White Laboratory, Inc. www.hpwhite.com | (410) 838-6550 |
| ICEA | Insulated Cable Engineers Association, Inc. www.icea.net | (770) 830-0369 |
| ICRI | International Concrete Repair Institute, Inc. www.icri.org | (847) 827-0830 |
| IEC | International Electrotechnical Commission www.iec.ch | 41 22 919 02 11 |
| IEEE | Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org | (212) 419-7900 |
| IESNA | Illuminating Engineering Society of North America www.iesna.org | (212) 248-5000 |

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| IENT | Institute of Environmental Sciences and Technology www.iest.org | (847) 255-1561 |
| IGCC | Insulating Glass Certification Council www.igcc.org | (315) 646-2234 |
| IGMA | Insulating Glass Manufacturers Alliance www.igmaonline.org | (613) 233-1510 |
| ISO | International Organization for Standardization www.iso.ch Available from ANSI www.ansi.org | 41 22 749 01 11 (202) 293-8020 |
| ISSFA | International Solid Surface Fabricators Association www.issfa.net | (877) 464-7732 (702) 567-8150 |
| ITS | Intertek www.intertek.com | (800) 345-3851 (713) 407-3500 |
| ITU | International Telecommunication Union www.itu.int/home | 41 22 730 51 11 |
| KCMA | Kitchen Cabinet Manufacturers Association www.kcma.org | (703) 264-1690 |
| LMA | Laminating Materials Association (Now part of CPA) | |
| LPI | Lightning Protection Institute www.lightning.org | (800) 488-6864 (804) 314-8955 |
| MBMA | Metal Building Manufacturers Association www.mbma.com | (216) 241-7333 |
| MFMA | Maple Flooring Manufacturers Association, Inc. www.maplefloor.org | (847) 480-9138 |
| MFMA | Metal Framing Manufacturers Association www.metalframingmfg.org | (312) 644-6610 |
| MH | Material Handling (Now MHIA) | |
| MHIA | Material Handling Industry of America www.mhia.org | (800) 345-1815 (704) 676-1190 |
| MIA | Marble Institute of America www.marble-institute.com | (440) 250-9222 |
| MPI | Master Painters Institute www.paintinfo.com | (888) 674-8937 |
| MSS | Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com | (703) 281-6613 |
| NAAMM | National Association of Architectural Metal Manufacturers www.naamm.org | (312) 332-0405 |
| NACE | NACE International (National Association of Corrosion Engineers International) | (800) 797-6623 (281) 228-6200 |

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| | www.nace.org | |
| NADCA | National Air Duct Cleaners Association www.nadca.com | (202) 737-2926 |
| NAGWS | National Association for Girls and Women in Sport www.aahperd.org/nagws/ | (800) 213-7193, ext. 453 |
| NAIMA | North American Insulation Manufacturers Association www.naima.org | (703) 684-0084 |
| NBGQA | National Building Granite Quarries Association, Inc. www.nbgqa.com | (800) 557-2848 |
| NCAA | National Collegiate Athletic Association (The) www.ncaa.org | (317) 917-6222 |
| NCMA | National Concrete Masonry Association www.ncma.org | (703) 713-1900 |
| NCPI | National Clay Pipe Institute www.ncpi.org | (262) 248-9094 |
| NCTA | National Cable & Telecommunications Association www.ncta.com | (202) 775-3550 |
| NEBB | National Environmental Balancing Bureau www.nebb.org | (301) 977-3698 |
| NECA | National Electrical Contractors Association www.necanet.org | (301) 657-3110 |
| NeLMA | Northeastern Lumber Manufacturers' Association www.nelma.org | (207) 829-6901 |
| NEMA | National Electrical Manufacturers Association www.nema.org | (703) 841-3200 |
| NETA | InterNational Electrical Testing Association www.netaworld.org | (888) 300-6382 (303) 697-8441 |
| NFHS | National Federation of State High School Associations www.nfhs.org | (317) 972-6900 |
| NFPA | NFPA (National Fire Protection Association) www.nfpa.org | (800) 344-3555 (617) 770-3000 |
| NFRC | National Fenestration Rating Council www.nfrc.org | (301) 589-1776 |
| NGA | National Glass Association www.glass.org | (866) 342-5642 (703) 442-4890 |
| NHLA | National Hardwood Lumber Association www.natlhardwood.org | (800) 933-0318 (901) 377-1818 |
| NLGA | National Lumber Grades Authority www.nlga.org | (604) 524-2393 |
| NOFMA | NOFMA: The Wood Flooring Manufacturers Association | (901) 526-5016 |

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| | (Formerly: National Oak Flooring Manufacturers Association) www.nofma.org | |
| NRCA | National Roofing Contractors Association www.nrca.net | (800) 323-9545 (847) 299-9070 |
| NRMCA | National Ready Mixed Concrete Association www.nrmca.org | (888) 846-7622 (301) 587-1400 |
| NSF | NSF International (National Sanitation Foundation International) www.nsf.org | (800) 673-6275 (734) 769-8010 |
| NSSGA | National Stone, Sand & Gravel Association www.nssga.org | (800) 342-1415 (703) 525-8788 |
| NTMA | National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com | (800) 323-9736 (540) 751-0930 |
| NTRMA | National Tile Roofing Manufacturers Association (Now TRI) | |
| NWWDA | National Wood Window and Door Association (Now WDMA) | |
| OPL | Omega Point Laboratories, Inc. (Acquired by ITS - Intertek) www.opl.com | (800) 966-5253 (210) 635-8100 |
| PCI | Precast/Prestressed Concrete Institute www.pci.org | (312) 786-0300 |
| PDCA | Painting & Decorating Contractors of America www.pdca.com | (800) 332-7322 (314) 514-7322 |
| PDI | Plumbing & Drainage Institute www.pdionline.org | (800) 589-8956 (978) 557-0720 |
| PGI | PVC Geomembrane Institute http://pgi-tp.ce.uiuc.edu | (217) 333-3929 |
| PLANET | Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America) www.landcarenetwork.org | (800) 395-2522 (703) 736-9666 |
| PTI | Post-Tensioning Institute www.post-tensioning.org | (602) 870-7540 |
| RCSC | Research Council on Structural Connections www.boltcouncil.org | (800) 644-2400 (312) 670-2400 |
| RFCI | Resilient Floor Covering Institute www.rfci.com | (301) 340-8580 |
| RIS | Redwood Inspection Service www.calredwood.org | (888) 225-7339 (415) 382-0662 |
| SAE | SAE International www.sae.org | (877) 606-7323 (724) 776-4841 |
| SDI | Steel Deck Institute www.sdi.org | (847) 458-4647 |

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| SDI | Steel Door Institute www.steeldoor.org | (440) 899-0010 |
| SEFA | Scientific Equipment and Furniture Association www.sefalabs.com | (516) 294-5424 |
| SGCC | Safety Glazing Certification Council www.sgcc.org | (315) 646-2234 |
| SIA | Security Industry Association www.siaonline.org | (703) 683-2075 |
| SJI | Steel Joist Institute www.steeljoist.org | (843) 626-1995 |
| SMA | Screen Manufacturers Association www.smacentral.org | (561) 533-0991 |
| SMACNA | Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org | (703) 803-2980 |
| SMPTE | Society of Motion Picture and Television Engineers www.smpte.org | (914) 761-1100 |
| SPFA | Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org | (800) 523-6154 |
| SPIB | Southern Pine Inspection Bureau (The) www.spib.org | (850) 434-2611 |
| SPRI | Single Ply Roofing Industry www.spri.org | (781) 647-7026 |
| SSINA | Specialty Steel Industry of North America www.ssina.com | (800) 982-0355 (202) 342-8630 |
| SSPC | SSPC: The Society for Protective Coatings www.sspc.org | (877) 281-7772 (412) 281-2331 |
| STI | Steel Tank Institute www.steeltank.com | (847) 438-8265 |
| SWI | Steel Window Institute www.steelwindows.com | (216) 241-7333 |
| SWRI | Sealant, Waterproofing, & Restoration Institute www.swrionline.org | (816) 472-7974 |
| TCA | Tile Council of America, Inc. www.tileusa.com | (864) 646-8453 |
| TIA/EIA | Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org | (703) 907-7700 |
| TMS | The Masonry Society www.masonrysociety.org | (303) 939-9700 |
| TPI | Truss Plate Institute, Inc. | (703) 683-1010 |

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| | www.tpinst.org | |
| TPI | Turfgrass Producers International www.turfgrasssod.org | (847) 649-5555 |
| TRI | Tile Roofing Institute (Formerly: RTI - Roof Tile Institute) www.tilerroofing.org | (312) 670-4177 |
| UL | Underwriters Laboratories Inc. www.ul.com | (877) 854-3577 (847) 272-8800 |
| UNI | Uni-Bell PVC Pipe Association www.uni-bell.org | (972) 243-3902 |
| USAV | USA Volleyball www.usavolleyball.org | (888) 786-5539 (719) 228-6800 |
| USGBC | U.S. Green Building Council www.usgbc.org | (202) 828-7422 |
| USITT | United States Institute for Theatre Technology, Inc. www.usitt.org | (800) 938-7488 (315) 463-6463 |
| WASTEC | Waste Equipment Technology Association www.wastec.org | (800) 424-2869 (202) 244-4700 |
| WCLIB | West Coast Lumber Inspection Bureau www.wclib.org | (800) 283-1486 (503) 639-0651 |
| WCMA | Window Covering Manufacturers Association (Now WCSC) | |
| WCSC | Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association) www.windowcoverings.org | (800) 506-4636 (212) 297-2109 |
| WDMA | Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com | (800) 223-2301 (847) 299-5200 |
| WI | Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org | (916) 372-9943 |
| WIC | Woodwork Institute of California (Now WI) | |
| WMMPA | Wood Moulding & Millwork Producers Association www.wmmpa.com | (800) 550-7889 (530) 661-9591 |
| WSRCA | Western States Roofing Contractors Association www.wsrca.com | (800) 725-0333 (650) 570-5441 |
| WWPA | Western Wood Products Association www.wwpa.org | (503) 224-3930 |

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| | | |
|---------|---|----------------------------------|
| IAPMO | International Association of Plumbing and Mechanical Officials www.iapmo.org | (909) 472-4100 |
| ICBO | International Conference of Building Officials (See ICC) | |
| ICBO ES | ICBO Evaluation Service, Inc. (See ICC-ES) | |
| ICC | International Code Council www.iccsafe.org | (888) 422-7233 (703) 931-4533 |
| ICC-ES | ICC Evaluation Service, Inc. www.icc-es.org | (800) 423-6587 (562) 699-0543 |
| D. | Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents. | |
| CE | Army Corps of Engineers www.usace.army.mil | |
| CPSC | Consumer Product Safety Commission www.cpsc.gov | (800) 638-2772 (301) 504-7923 |
| DOC | Department of Commerce www.commerce.gov | (202) 482-2000 |
| DOD | Department of Defense http://dodssp.daps.dla.mil | (215) 697-6257 |
| DOE | Department of Energy www.energy.gov | (202) 586-9220 |
| EPA | Environmental Protection Agency www.epa.gov | (202) 272-0167 |
| FAA | Federal Aviation Administration www.faa.gov | (866) 835-5322 |
| FCC | Federal Communications Commission www.fcc.gov | (888) 225-5322 |
| FDA | Food and Drug Administration www.fda.gov | (888) 463-6332 |
| GSA | General Services Administration www.gsa.gov | (800) 488-3111 |
| HUD | Department of Housing and Urban Development www.hud.gov | (202) 708-1112 |
| LBL | Lawrence Berkeley National Laboratory www.lbl.gov | (510) 486-4000 |
| NCHRP | National Cooperative Highway Research Program (See TRB) | |
| NIST | National Institute of Standards and Technology www.nist.gov | (301) 975-6478 |
| OSHA | Occupational Safety & Health Administration | (800) 321-6742 |

| | | |
|------|---|----------------|
| | www.osha.gov | (202) 693-1999 |
| PBS | Public Building Service (See GSA) | |
| PHS | Office of Public Health and Science www.osophs.dhhs.gov/ophs | (202) 690-7694 |
| RUS | Rural Utilities Service (See USDA) | (202) 720-9540 |
| SD | State Department www.state.gov | (202) 647-4000 |
| TRB | Transportation Research Board www.nas.edu/trb | (202) 334-2934 |
| USDA | Department of Agriculture www.usda.gov | (202) 720-2791 |
| USPS | Postal Service www.usps.com | (202) 268-2000 |

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
 - 2. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 3. Division 01 Section "Execution" for progress cleaning requirements.
 - 4. Divisions 02 through 33 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.2 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Portable Sewer Service: Pay portable sewer service use charges for sewer usage by all entities for construction operations.
- C. Electric Power Service: Contractor shall pay electric power service use charges for electricity used by all entities for construction operations. Provide connections and extensions of services as required for construction operations.
- D. Water Service: Contractor shall pay water service use charges for water used by all entities for construction operations. Provide connections and extensions of services as required for construction operations.

1.4 QUALITY ASSURANCE

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

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for protection of each permanent service before Owner's acceptance, regardless of previously assigned responsibilities. Permanent equipment and systems shall not be used during the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 9 gauge (0.148-inch) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

- B. Portable Chain-Link Fencing: Minimum **2-inch**, 9-gage, galvanized steel, chain-link fabric fencing; minimum **6 feet** high with galvanized steel pipe posts; minimum **2-3/8-inch**- OD line posts and **2-7/8-inch**- OD corner and pull posts, with **1-5/8-inch**- OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.
- C. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry."
- D. Gypsum Board: Minimum **1/2 inch** thick by **48 inches** wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
- E. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
- F. Paint: Comply with requirements in Division 09 painting Sections.

2.2 TEMPORARY FACILITIES

- A. Field Office, Contractor: Contractor shall provide prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Maintain field office until final project acceptance.
- B. Field Office Requirements: Of sufficient size to accommodate needs of district and construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and **4-foot**- square tack board.
 - 3. Heating and cooling equipment necessary to maintain a uniform indoor temperature of **68 to 72 deg F**.
 - 4. Lighting fixtures capable of maintaining average illumination of **20 fc** at desk height.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with **MERV of 8** at each return air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Coordinate with serving utility to provide water for construction purposes. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Permanent equipment may not be used for temporary construction period heating or cooling; except where specifically allowed for in individual specifications sections.
- E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- F. Electric Power Service: Provide extensions to electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
- G. Lighting: Provide temporary lighting with local switching that provides 25 foot candle minimum lighting or additional lighting for adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install two telephone line(s) for each field office.
 1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - g. Principal subcontractors' field and home offices.
 3. Provide superintendent with cellular telephone for use when away from field office.
- I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.
 1. Provide DSL in primary field office and minimum of one computer with e-mail and internet access in the job-site office.
 2. In addition to computer connections provide two phone lines and one fax machine in the job-site office.
 3. Contractor personnel must have expertise in e-mail correspondence to maintain team coordination. The Contractor will provide all computer equipment (hardware) necessary to accomplish this.
 4. The contractor must have the capability to provide electronic transfer of documents such as minutes and spreadsheets through one of the job-site positions
 5. The contractor shall provide the owner with e-mail and document transfer capability with the Project Manager at the home office of the company, if the Project Manager is not located at the job-site office

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within **30 feet** of building lines. Comply with NFPA 241.
 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
 - B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
 - C. Parking: The school district will allow parking in the areas designated in the drawings. These parking areas are for the use of construction personnel on a first-come, first-served basis. Additional, parking will only be allowed in areas that the **City of Richland** allows parking on streets.
 - D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
 - E. Project Identification and Temporary Signs: Provide Project identification signs as indicated below. Install signs as directed by Owner to inform public and individuals seeking entrance to Project. Any other or Unauthorized signs are not permitted.
 1. **Public Project Signs – NOT REQUIRED.**
 - F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.
 - G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
 - H. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
 - I. 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. Repair any damage to Owner's satisfaction.
 - J. Prohibit traffic and storage on waterproofed and roofed surfaces, and on lawn and landscaped areas.
 - K. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.
- 3.4 CONTROL, SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 1. Comply with work restrictions specified in Division 01 Section "Summary."
 - B. Temporary Erosion and Sedimentation Control: Comply with requirements of the **City of Richland** and others as indicated in the drawings.
 - C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - D. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
 - E. Dust Control:
 1. Contractor shall provide site watering as required to prevent wind driven dust per the **City of Richland and the Benton County Air Pollution** authority requirements and to

- prevent citizen complaints both during construction and during all non-construction periods such as nights, weekends, and/or holidays.
2. Contractor may use separate metered city water for both mobile and temporary fixed or portable sprinkler systems. Such systems shall not be operated without a contractor representative being on site full-time to verify operation, effectiveness and to prevent flooding or run-off damage
 3. A 24-hour phone number will be provide by the contractor for the police, Owner, Architect/Engineer, or other concerned agency to contact or notify as to dust conditions. Person responsible for shall have full authority, equipment, and manpower to take action to manage the impact of dust pollution within 30 minutes of notification
 4. If investigation of dust pollution is not accomplished by the contractor within 30 minutes of notification, the Owner and/or Architect/Engineer shall have full authority to hire/employ/or in any manner required provide for dust control and all costs of labor, material, and equipment shall be deducted from compensation due the contractor by uncontested change order
 5. The contractor shall pay for temporary connection all City water use needed and related to the construction of the new school including water used for dust control and irrigation until substantial completion has been issued for the project
- F. Provide security program and facilities to protect work, existing facilities, and Owner's operations from unauthorized entry, vandalism, and theft. Coordinate with Owner's security program.
- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
1. Extent of Fence: Entire Perimeter of Project Area. See Drawings.
 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.
- H. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
1. Prohibit smoking in all project areas.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
- L. The entire site is a non-smoking area. No drugs, tobacco, alcohol, or weapons of any kind shall be allowed on the site.
- M. No animals, radios or attire with inappropriate or vulgar graphics are allowed on-site.
- 3.5 OPERATION, TERMINATION, AND REMOVAL
- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
 - B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 01 Section "Alternates" for products selected under an alternate.
 - 2. Division 01 Section "References" for applicable industry standards for products specified.
 - 3. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
 - 4. Divisions 02 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature; that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
 - 4. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
 - a. The date of the standard is that in effect as of the Bid date, or date of Owner -Contractor Agreement when there are not bids, except when a specific date is specified
 - b. Obtain copies of standards when required by Contract Documents. Maintain copy at job site during progress of the specific work
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
 - 1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
 - 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.

- h. Identification of items that require early submittal approval for scheduled delivery date.
 - 3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
 - 4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - 5. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use facsimile of standard CSI substitution request form.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors; that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 - 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Acceptance: Change Order.
 - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
- C. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
 - b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.
 - D. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.
- 1.4 QUALITY ASSURANCE
- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING
- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 - B. Delivery and Handling:
 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Off-site storage within in 10 miles of the project site, complying with the requirements of the Supplementary Conditions of the Contract is allowed. Contractor may apply for payment on materials complying with these requirements.
 3. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 4. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 5. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 - C. Storage:
 1. Store products to allow for inspection and measurement of quantity or counting of units.
 2. Store materials in a manner that will not endanger Project structure.
 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 4. Store cementitious products and materials on elevated platforms.
 5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 7. Protect stored products from damage and liquids from freezing.
 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.
- 1.6 PRODUCT WARRANTIES
- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
 3. Refer to Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. All products shall be new.
 3. Products include material, equipment, and systems.
 4. Specifications and referenced standards are minimum requirements.
 5. Components required to be supplied in quantity within a specification section shall be the same, and shall be interchangeable.
 6. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 7. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 8. Where products are accompanied by the term "as selected," Architect will make selection.
 9. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 10. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 11. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
 3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with

- requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
 8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
 9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
 10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Substitutions:
 1. Products specified by Reference Standards or by Description Only: Any product meeting those standards.
 2. Products specified by Naming One or More Manufacturers: Submit a Request for Substitution for any manufacturer not specifically named.
 3. Products Specified by Naming Only One Manufacturer and a statement of No Substitution: No options, no substitutions allowed.
- C. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution will be considered only when a product becomes unavailable due to no fault of Contractor.
 3. Requested substitution does not require extensive revisions to the Contract Documents.
 4. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 5. Substitution request is fully documented and properly submitted.
 6. Requested substitution will not adversely affect Contractor's Construction Schedule.
 7. Requested substitution has received necessary approvals of authorities having jurisdiction.
 8. Requested substitution is compatible with other portions of the Work.

9. Requested substitution has been coordinated with other portions of the Work.
10. Requested substitution provides specified warranty.
11. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
12. Substitutions will not be considered or allowed when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.
13. Architect/Engineer and Owner will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

2.3 COMPARABLE PRODUCTS

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

PART 3 - EXECUTION (Not Used)

Substitution Request

TO _____

PROJECT _____

SPECIFIED ITEM _____

| Section | Page | Paragraph | Description |
|---------|------|-----------|-------------|
|---------|------|-----------|-------------|

The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION _____

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

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

The undersigned states that he 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 affect 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.

Submitted By _____

Attachments:

Signature _____

Firm _____

Address _____

Date _____

Telephone _____

Fax _____

Email _____

For use by Design Consultant:

____ Accepted ____ Accepted as noted

____ Not Accepted ____ Received too late

By _____

Date _____

Remarks _____

END OF SECTION 01 60 00

SECTION 01 73 00 – EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Coordination of Owner-installed products.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.
 - 8. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 01 Section "Submittal Procedures" for submitting surveys.
 - 3. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 4. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.

- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of **8 feet** in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Provide solid, fire-treated wood frame backing and blocking for all wall or ceiling surface mounted items, including but not limited to equipment, grab bars, door stops, partitions, railings, and other accessories. Contractor shall coordinate and verify the locations and installation of backing and blocking prior to the installation of gypsum board systems.
- H. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER-INSTALLED PRODUCTS

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

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

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

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Execute cutting and patching to integrate elements of work, uncover ill-timed, defective, and non-conforming work, provide openings for penetrations of existing surfaces, and provide samples for testing. Seal and finish penetrations through floors, walls, and ceilings
- C. Patch locations where existing substrates and surfaces are damaged and deteriorated. Patch the surfaces to new quality work and complete the specified finish treatment of the areas.
- D. In all framed wall and ceilings areas that are a part of this project, remove existing surface mounted conduit, raceways, and boxes and recess these utilities into the framed construction. Cut and patch existing finishes as required to accommodate this work.
- E. In all locations where existing materials or improvements are removed from existing wall or ceiling construction, the finishes of the newly exposed wall or ceiling shall be patched and finished to match adjacent exposed surfaces in the room. This requirement shall include, but not be limited to, all masonry, concrete, plaster, and gypsum wallboard installations throughout the project area.
- F. Cut and patch existing concrete floor slab assemblies as required for installation of building utilities systems. Reference new construction drawing, including but not limited to mechanical and electrical work, for extent of work requiring cutting and patching.
- G. Related Sections include the following:
 - 1. Division 02 Section "Structure Demolition" for demolition of selected portions of the building.
 - 2. Divisions 02 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work. Newly patched surfaces shall match existing adjacent finishes in alignment, appearance, quality and materials.

1.3 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 - 1. Primary operational systems and equipment.
 - 2. Fire-suppression systems.
 - 3. Mechanical systems piping and ducts.
 - 4. Control systems.
 - 5. Communication systems.
 - 6. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Exterior curtain-wall construction.
 - 4. Equipment supports.

- 5. Piping, ductwork, vessels, and equipment.
 - 6. Noise- and vibration-control elements and systems.
 - D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
 - E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- 1.4 WARRANTY
- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- A. General: Comply with requirements specified in other Sections.
 - B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

- 3.1 EXAMINATION
- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.
- 3.2 PREPARATION
- A. Temporary Support: Provide temporary support of Work to be cut.
 - B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
 - C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
 - D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- 3.3 PERFORMANCE
- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
 - B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or

adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for environmental-protection measures during construction.
 - 2. Division 02 Section "Structure Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.

1.2 DEFINITIONS

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

1.3 PERFORMANCE

- A. Owner's goal is to salvage and recycle as much nonhazardous demolition and construction waste as possible. Demolition waste includes the following materials:
 - 1. Demolition Waste:
 - a. Asphaltic concrete paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.
 - d. Concrete masonry units.
 - e. Wood studs.
 - f. Wood joists.
 - g. Plywood and oriented strand board.
 - h. Wood trim.
 - i. Structural and miscellaneous steel.
 - j. Rough hardware.
 - k. Roofing.
 - l. Insulation.
 - m. Doors and frames.
 - n. Door hardware.
 - o. Windows.
 - p. Glazing.
 - q. Metal studs.
 - r. Gypsum board.
 - s. Acoustical tile and panels.
 - t. Carpet.

- u. Equipment.
- v. Cabinets.
- w. Plumbing fixtures.
- x. Piping.
- y. Supports and hangers.
- z. Valves.
- aa. Sprinklers.
- bb. Mechanical equipment.
- cc. Refrigerants.
- dd. Electrical conduit.
- ee. Copper wiring.
- ff. Lighting fixtures.
- gg. Lamps.
- hh. Ballasts.
- ii. Electrical devices.
- jj. Switchgear and panelboards.
- kk. Transformers.
- 2. Construction Waste:
 - a. Site-clearing waste.
 - b. Masonry and CMU.
 - c. Lumber.
 - d. Wood sheet materials.
 - e. Wood trim.
 - f. Metals.
 - g. Roofing.
 - h. Insulation.
 - i. Carpet.
 - j. Gypsum board.
 - k. Piping.
 - l. Electrical conduit.
 - m. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.4 SUBMITTALS

- A. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- B. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

3.2 RECYCLING WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.

- 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Division 32 Section "Plants." for use of clean sawdust as organic mulch.
 - C. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - a. Comply with requirements in Division 32 Section "Plants." for use of clean ground gypsum board as inorganic soil amendment.
- 3.4 DISPOSAL OF WASTE
- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - B. Burning: Do not burn waste materials.
 - C. Disposal: Transport waste materials off Owner's property and legally dispose of them at contractor's expense.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Standard and Special Warranties.
 - 3. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 01 Section "Execution" for progress cleaning of Project site.
 - 3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
 - 6. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.
 - 7. Reference Document A201 for Project Closeout and Final Completion requirements.

1.2 SUBSTANTIAL COMPLETION

- A. The requirements for Substantial Completion shall apply to each individual sub-portion of the project including each intermediate deadline. Reference section 01 10 00 for definition of the required project schedule.
- B. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include **City of Richland** issued permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Terminate and remove temporary facilities from Project site.
- C. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

- A. When Contractor considers work has reached Final Completion, submit written certification that Contract Documents have been reviewed, work has been inspected, **City of Richland** has deemed the project complete and that work is complete in accordance with Contract Documents and ready for

Architect/Engineer inspection utilizing the completely updated as-built drawing set showing all changes.

- B. In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.
- C. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
 - 1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
 - 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 - 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - 4. General Information - Provide copies of each of the following:
 - a. Local jurisdiction final inspection document
 - b. Lien Releases
 - c. Consent of Surety
 - d. Certificates of Insurance
 - e. Contractor's and Subcontractor's One-Year Warranty Letter
 - f. Photocopies of warranties and bonds
 - g. Labor and Industries required Affidavit of Prevailing Wage Paid statements.
 - h. Construction Material Asbestos Statement
 - i. Operations and Maintenance Manuals
 - j. Owner Equipment Training Completion summary with attendee signatures.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1.5 WARRANTIES

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

- E. Provide Special Warranties as noted in specifications. Special Warranties shall cover all replacement and materials costs for stated duration beyond substantial completion as noted. Special Warranty shall include: labor, materials, freight, shipping, maintenance, equipment, tools on all failing parts. Special Warranty to be provided by manufacturer and installer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations. Clean all areas defined below, to Owner satisfaction.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean.
 - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.
 - k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - l. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Replace parts subject to unusual operating conditions.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

- o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - r. Re-clean as often as necessary as may be required by work performed after final cleaning and inspection.
- C. Pest Control: If pest problem exists, engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 4. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 DEFINITIONS

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

1.3 SUBMITTALS

- A. Initial Submittal: Submit (1) draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.
- B. Final Submittal: Submit (2) paper copies of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit (2) FINAL copies of each corrected manual within 15 days of receipt of Architect's comments.
 - 2. Provide complete pdf copy of each FINAL manual.

1.4 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name, address, and telephone number of Contractor.
 - 6. Name and address of Architect.
 - 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf view binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 - 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 - 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

- b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.
- 6. Provide manual for Building Products, Applied Materials, and Finishes: include product data with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.
- 7. Provide instruction 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
- 8. Include moisture-protection and Weather-exposed Products product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions.
 - 2. Performance and design criteria if Contractor is delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Seasonal and weekend operating instructions.
 - 8. Required sequences for electric or electronic systems.
 - 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding rivets where required for identification. Reference Division 22 specifications.

2.4 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
 - C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
 - D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
 - E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
 - F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.
- 2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL
- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
 - B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
 - C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard printed maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
 - D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training videotape, if available.
 - E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
 - F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- 2.6 WARRANTIES AND BONDS
 - A. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Prepare and submit two identical sets of warranties and bonds.
 - 2. Bind in commercial quality (8-1/2 x 11-inch) three post binders, with hardback and engraved test on edge.
 - 3. Label edge of each binder with printed title "WARRANTIES AND BONDS", with title of project; name, address and telephone number of Contractor; and name of responsible principal.
 - 4. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
 - 5. 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 or responsible principal.
 - 6. Obtain full, one-year minimum warranties and bonds and/or actual time required by specific specification sections, executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten (10) days after substantial completion of the project. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the date of substantial completion and/or continued use by the Owner is determined.
 - 7. Verify that documents are in proper form, contain full information, and are notarized.
 - 8. Co-execute submittals when required.
 - 9. Retain warranties and bonds until time specified for submittal.
 - 10. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

- 3.1 MANUAL PREPARATION
 - A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
 - B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
 - C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
 - D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
 - E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."
 - G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.
- 3.2 MAINTENANCE INSTRUCTION
- A. Provide instruction of Owner's personnel in maintenance of products.

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include the following:
 - 1. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Contractor to submit one set(s) of marked-up Record Prints.
 - 2. Number of Copies: Contractor to submit copies of Record Drawings as follows:
 - a. Initial Submittal: Submit one set(s) of marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return plots and prints for organizing into sets, printing, binding, and final submittal.
 - b. Final Submittal: Submit one set(s) of marked-up Record Prints, and three copies printed. Print each Drawing, whether or not changes and additional information were recorded.
 - 1) Electronic Media: DVD or USB Flash Drive.
- B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one copy of each Product Data submittal.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.
- D. Store Record Documents and Samples in Owner's Office apart from documents used for construction. Provide files, racks, and secure storage for Record Documents and Samples.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Record information concurrently with construction progress. Do not conceal any work until required information is recorded
 - b. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - c. Accurately record information in an understandable drawing technique.
 - d. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Transparencies: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected transparencies of the Contract Drawings and Shop Drawings.
 1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
 2. Refer instances of uncertainty to Architect for resolution.
 3. Owner will furnish Contractor one set of transparencies of the Contract Drawings for use in recording information.
 4. Print the Contract Drawings and Shop Drawings for use as Record Transparencies. Architect will make the Contract Drawings available to Contractor's print shop.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
 3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.
- C. At Contract closeout, deliver submittal Record Documents, and three (3) black line copies, edge bound in complete sets.
- D. Transmit submittals with cover letter, 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

END OF SECTION 01 78 39

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training manuals.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for requirements for pre-instruction conferences.
 - 2. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.
- C. Furnish demonstration and training instruction time as required to educate and train Owner personnel. No additional payment will be made for time spent for demonstration, training, assembling educational materials, setting up, or cleaning up. At completion of each training, submit list of Owner personnel who participated in the training.
- D. Training shall be subject to Owner approval. Once approved by Owner, various MEP Training line items in Schedule of Value can be invoiced. See specification 01 29 00.

1.2 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. At completion of training, submit one complete training manual(s) for Owner's use.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.3 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- B. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.4 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Manufacturers' Instruction and O&M Manual - Submit manufacturers' printed instructions /O&M manuals for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified. Submit prior to equipment start up.
- B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
 - 1. Motorized doors, including overhead coiling doors overhead coiling grilles and automatic entrance doors.
 - 2. Equipment, including projection screens, food-service equipment.
 - 3. Fire-protection systems, including fire alarm and fire-extinguishing systems.
 - 4. Intrusion detection systems.
 - 5. HVAC systems, including air-handling equipment, air distribution systems, and terminal equipment and devices.
 - 6. HVAC instrumentation and controls.
 - 7. Electrical service and distribution, including transformers, switchboards, panelboards, and motor controls.
 - 8. Lighting equipment and controls.
 - 9. Communication systems, including intercommunication, surveillance, clocks and programming, voice and data, and, television] equipment.
- C. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.

- d. Regulation and control procedures.
- e. Control sequences.
- f. Safety procedures.
- g. Instructions on stopping.
- h. Normal shutdown instructions.
- i. Operating procedures for emergencies.
- j. Operating procedures for system, subsystem, or equipment failure.
- k. Seasonal and weekend operating instructions.
- l. Required sequences for electric or electronic systems.
- m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 - 3. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner with at least seven days' advance notice.
- C. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

- D. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

OPERATION AND MAINTENANCE INSTRUCTION

The Operation and Maintenance Procedures for the following list of systems has been demonstrated to the Owner's Representatives on the dates indicated below. This form is to be included in the Operation and Maintenance Manuals – Part 2.

| <u>INITIAL</u> | <u>SYSTEM DEMONSTRATED</u> | <u>DATE</u> |
|----------------|----------------------------|-------------|
| <hr/> | H.V.A.C. | <hr/> |
| <hr/> | PLUMBING | <hr/> |
| <hr/> | FIRE PROTECTION | <hr/> |
| <hr/> | ELECTRICAL | <hr/> |
| <hr/> | COMMUNICATIONS | <hr/> |
| <hr/> | FIRE SPRINKLER | <hr/> |
| <hr/> | OTHER | <hr/> |
| <hr/> | | <hr/> |

Contractor's Representative _____

Contractor's Representative _____

Owner's Representative _____

Owner's Representative _____

Owner's Representative _____

Owner's Representative _____

Owner's Representative _____

END OF SECTION 01 79 00

SECTION 01 80 01 - KEYNOTE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and details in these documents have been annotated using a "Keynoting" system to improve drawing clarity and document coordination. The first six digits of the keynote indicate the specification section covering the referenced item. Following a decimal point is a two digit number which serves to make each keynote unique with architect's internal noting database.
- B. As in other annotation systems, this system is not intended to remove the contractor's responsibility for submitting a complete and comprehensive bid that covers all work associated with the Work being bid. While every effort has been made to ensure that all work covered by keynotes is properly cross-referenced to a specification section and division, it is not represented to be a comprehensive list of all the work. All provisions of the Specifications are no less applicable than they would be in the absence of an integrated keynoting system.
- C. Be aware that not all sections of work or portions of work occurring within the graphic portions of the Contract Documents may have been annotated using the keynoting system.

PART 2 - PRODUCTS – NOT USED.

PART 3 - EXECUTION – NOT USED.

END OF SECTION 01 80 01

SECTION 01 91 13 GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Services Furnished

1. The purpose of commissioning is to provide the Owner assurance that the systems listed in this section (mechanical, electrical & specialty) have been installed in the prescribed manner and will operate properly to fulfill the design intent as laid out in the Contract documents. Commissioning is a systematic process intended to enhance the quality of system start-up and aid in the orderly transfer of systems to beneficial use by the Owner. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
 - a. Verify that applicable component equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 - b. Verify and document proper performance of component equipment and systems with Functional Performance Tests, (FPT).
 - c. Verify that O&M documentation left on site is complete.
 - d. Verify that the Owner's operating personnel are adequately trained.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. General Responsibilities The Contractor verifies installation, provides scheduling and coordination of commissioning activities, performs training, starts up component equipment, performs Pre-verification testing, assists with functional performance testing, corrects deficiencies and assists with retests.
 1. Furnish labor and material to accomplish building commissioning as specified herein.
 2. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.
 3. Commissioning does not relieve the Contractor of Contract obligations.
- B. The Commissioning Authority (CA), hired directly by the Owner, provides the Owner an unbiased, objective view of the systems; installation, documentation, operation, and performance. The responsibilities of the CA are indicated here for information only.
 1. The CA reviews submittals for compliance with the original design intent as reflected in the contract documents.
 2. The CA will use Facility Grid and Facility Grid app for installation checklists, Start-up, Pre-verification tests, Functional performance tests, and issues log, in addition to other project documentation. Facility Grid and Facility Grid app for issued for the project at no cost to the Contractor.
 3. The CA performs component equipment installation verification throughout the course of the project.
 4. The CA verifies completion of installation and witnesses start up of component equipment
 5. The CA develops Functional Performance Tests (FPT) for component equipment and systems listed in this section. These tests when approved will be used as Pre-verification tests by the Contractor to show that all equipment and systems are working correctly.
 6. Once the Contractor has completed the Pre-verification tests, the CA, with the assistance of the contractor, performs the Functional Performance tests for the equipment and the systems

designated in this section for confirmation that the Pre-verification tests are complete. The tests verify conformance to the sequence of operation and design intent as reflected in the contract documents.

7. The CA will develop and maintain an Issues log through the warranty period.

C. Coordination

1. The Contractor will provide overall coordination of the commissioning program as specified herein. The Commissioning process will require cooperation of the Contractor, subcontractors, vendors, Architect, CA, and Owner. The commissioning team will be comprised of the following:
 - a. Contractor
 - 1) Subcontractors (as required by the Contractor)
 - b. Commissioning Authority (CA)
 - 1) Consultants (as required by the CA)
 - c. Owner's Representative (s)
 - 1) Project Manager
 - 2) Maintenance Staff
 - d. Design Team
 - 1) Architect
 - 2) Mechanical consultant
 - 3) Electrical consultant
 - 4) Specialty consultant (s)

D. Scheduling

1. Integrate commissioning requirements into the Critical Path Method (CPM) master construction schedule. Commissioning scheduling is the responsibility of the Contractor.
2. In the Construction Schedule, the Contractor will schedule Commissioning Tasks. These tasks will include but are not limited to the following:
 - a. Submittals
 - b. Installation Checklists
 - c. Component equipment Start-up
 - d. System Integration
 - e. Functional Performance Testing
 - f. O&M Manuals
 - g. Training
 - h. Other tasks as required, i.e. phasing.
3. The Contractor will provide a copy of the CPM master construction schedule and updates to the CA as part of regular schedule updates and distribution.

E. Commissioning Meetings

1. Commissioning Kick-off Meeting: Within 90 days from Notice to Proceed, the CA will call for a Commissioning Kick-off Meeting. The purpose of this meeting is to give instructions to the contractor on the importance of construction Installation checklists. The use of Facility Grid and the Facility Grid app for completing checklists as work progresses will be discussed and access issued to each Contractor and Sub-contractor, as needed. The Commissioning process will be explained in detail, including startup procedures, O & M manuals, training, and closeout procedures.
2. Issues related to commissioning will be discussed as required during regularly scheduled Project Meetings. All Issues will be responded to through Facility Grid.
3. The CA may require additional meetings if the commissioning process appears to be behind schedule or if there are coordination issues.

1.3 COMPONENT EQUIPMENT & SYSTEMS TO COMMISSION

A. Definitions:

1. Component equipment or Component – a constituent element, as of a system, part of a mechanical or electrical complex.
2. System - A group of interacting, interrelated, or interdependent elements forming a complex whole, a condition of harmonious, orderly interaction.
3. Integrate - To make into a whole by bringing all parts together; unify. Many systems are coordinated with or integrated into other systems (fire/smoke dampers with fire alarm). Integration of component equipment into systems, and system-to-system integration will be tested as noted in the matrix

B. Life / Safety Systems

Critical Life Safety Systems are summarized but not limited to the following:

1. Systems:
 - a. Automatic fire protection systems, Division 21
 - b. Emergency lighting
 - c. Fire Alarm systems
 - d. Elevator / wheel chair lifts
 - e. Fire Doors

C. Mechanical Systems

Critical Mechanical systems are identified in the General Conditions, Divisions 22-23, and summarized, but not limited to, the following:

1. Systems:
 - a. HVAC: All HVAC systems including, but not limited to: boilers, chillers, air handling, exhaust & hydronic systems, fan coils valves & pumps.
 - b. Domestic Water & DWV: All domestic water systems including, but not limited to: Water Heaters, pumps, pressure regulators, back-flow preventers, automatic flush valves, automatic faucets, and solenoid valves. All drain, waste and vent systems including interior rain leaders and storm drains
 - c. Controls: The entire temperature control system including, but not limited to: Interface with all hardware devices and component equipment, programming of all specified schedules and sequences of operation, remote site interface.
2. System integration as applicable

D. Electrical Systems

Critical Electrical systems are identified in the General Conditions, Divisions 26-28, and summarized, but not limited to, the following:

1. Systems:
 - a. Unit substations
 - b. MCCs
 - c. Panel Boards: All panel boards including, but not limited to, main & sub-switchboards (480V and 208V) on individual panels.
 - d. Lighting: All lighting fixtures interior and exterior, controls for each, occupancy sensors, daylighting and harvesting controls, low voltage control system connections & interface to energy management system.
 - e. VOIP/Phone/Intercom systems
 - f. PA system
 - g. Data

h. Security and Security Notification Systems

1.4 QUALITY ASSURANCE

- A. The matrix below outlines required commissioning activities by system.
- B. The CA is responsible for Functional Performance Testing of the component equipment listed in this section.
- C. As noted in the matrix, testing required by the Architect's Consultants or the Authority Having Jurisdiction (AHJ) will serve as Functional Performance Tests for those systems. The contractor will notify the CA fourteen (14) days in advance of such tests. The CA will witness testing by the Architect's Consultants and the AHJ to assure that they are adequate to completely test the systems. If the CA is unavailable at the scheduled time and location of the activity, so note, and proceed per schedule.
 - 1. The Contactor will provide the CA with copies of the results of testing performed by others and within three (3) working days of the test. A list of corrections (if required) will be included.
 - 2. If the CA determines that the tests are not adequate to exercise all functions of the system, the CA will develop additional tests and test the system to assure the owner that the system is completely functional.

1.5 SUBMITTALS

- A. Normal Submittals
 - 1. The CA will receive a copy of the normal submittals for all component equipment or systems to be commissioned, (see matrix above).
 - 2. The CA will review and approve normal Contractor submittals applicable to systems being commissioned for compliance with design intent, concurrent with the A/E reviews.
 - 3. The CA will receive any manufacturer's installation or start-up checklists with the submittal package for any commissioned equipment.
 - 4. The CA may request further documentation necessary for the commissioning process.
 - 5. Contractor's responsibility for deviations in submittals from requirements of the Contract Documents is not relieved by the CA's review.
- B. Installation Checklists
 - 1. Contractor will utilize Installation Checklists provided through the Facility Grid app for any commissioned Division. Installation Checklists are used to track proper and complete installation, start up and system integration of each component and each system being commissioned.
 - a. The Contractor will be required to use Facility Grid Mobile app for filling out the installation checklists. Training will be available for use of the mobile app at no charge to the Contractor. The Facility Grid app allows all project participants to work on their projects in the field without internet connection. The Facility Grid app works for each of the three most popular mobile platforms: iOS, Android and Microsoft.
 - b. The Contractor will syncretize the app when the internet is available. The entries are time stamped for transparency.

2. CA will verify with Facility Grid that the Installation Checklists are being completed and if work has not progressed sufficiently, equipment started up may be delayed.

C. Startup Plan

1. Develop a project startup plan for all components and systems to be commissioned. Commence with component start-up after CA & Architect has approved the start-up plan and the CA has reviewed the installation checklists for completion.
2. The Contractor will witness system start-up and repair all system and component deficiencies noted during start-up.
3. The CA, the Architect's consultant (s), and / or the Owner's Representative will witness all start-up and test activities specified in this Section. The CA will designate witnesses and alternates for each activity.
4. Obtain the signature of designated witness on all data forms. If the witness is unavailable at the scheduled time and location of the activity, so note, and proceed per schedule without witness.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION CHECKLISTS

A. Installation Checklists and Installation Verification

1. The Contractor will install all equipment in accordance with the Contract Documents. The Contractor will track, using Facility Grid and the Facility Grid app, the installation of all component equipment and systems being installed as listed in this section. Tracking will be done as the work progresses using the Installation Checklists located on the Facility Grid app for all commissioned Divisions in this Specification Set.
2. The Installation Checklists are listed for each component or system. The installation checklists will be maintained and up dated on the Facility Grid app.
3. During on-site visits, the CA will perform a quality review of the work being completed. This may include a review of the installation checklists on the Faculty Grid app to ensure the work is being accomplished according to the contract documents.
4. If issues are found, the contractor will be notified of the issues and will be responsible for rechecking all components and systems affected. Once this is accomplished, the CA will re-verify the checklists for compliance with the contract documents.
 - a. The level of urgency will be indicated along with a resolution due date.
5. The actual completed installation checklists for each component being started will be available to the CA for review on the Facility Grid app. The CA will check the progress of the Installation Checklists prior to Startup and Commissioning. Startup will not proceed without the approval of the CA.
6. Minor equipment issues will be listed on the Installation checklist and a complete list of issues for all equipment to be started will be available to the CA prior to start up.

- a. The Contractor will be responsible for completion of all work including change orders and punch list items to the satisfaction of the Owner's Representative and Architect.
- 7. If any work is found to be incomplete, inaccessible, incorrect, or non-functional, make note of deficiencies and correct deficiencies before system start-up work proceeds.
- 8. Each checklist will have a place for the person doing the checkout to sign and date each item indicating the task has been completed.

3.2 SYSTEM START-UP

- A. Project Start-up Plan: At least 14 days prior to start-up, submit to the Commissioning Team for review and approval, a Project start-up plan for all equipment to be commissioned, consisting of the following items:
 - 1. Project Name
 - 2. Date and time of planned start-up
 - 3. System and component equipment name(s)
 - 4. Component equipment location and ID number
 - 5. Participating parties
 - 6. A copy of the specification section and manufacturer's installation instructions describing the start-up requirements
 - 7. The specific sequence of operations or other specified parameters being used during the start-up process.
 - 8. Specific step-by-step procedures to execute the start-up, in a clear, sequential and repeatable format for each component in the system.
 - 9. Special cautions, alarm limits, load restrictions, etc.
 - 10. The Contractor will take corrective action on all system deficiencies noted and demonstrate suitable system operation.
 - 11. Owner's Representative and CA will physically witness start-up procedures. Contractor will obtain signature of the Owner's Representative and CA indicating successful start-up.
- B. Notify the Commissioning Team in writing seven (7) days prior to component equipment start-up with an agenda that will include the date, time, location, and anticipated duration for each piece of component equipment and/or system to be started.
- C. Provide written notice a minimum of 72 hours in advance of any changes in date, time, location, or anticipated duration of start-up activities. All participants of the Commissioning team will receive notice. Contractor will reimburse Owner for actual costs incurred by the Owner as a result of failure to provide timely notice.

3.3 SYSTEM INTEGRATION & PRE-VERIFICATION TESTING

- A. After successful start up of each component being commissioned, the contractor will continue to utilize Facility Grid for installation checklist and other applicable documentation to verify the integration of individual components into a fully functional system through the BAS or other means of control or automation.
- B. Perform Pre-Functional Testing. It is required that the Contractor obtain the approved Pre-verification Tests from the Facility Grid app and perform the PVTs to verify complete and correct component and system operation prior to formal FPT by the CA. Refer to 'Cost of Retesting' in Part 3 of this section.

3.4 SUBSTANTIAL COMPLETION

- A. General: See Division 01 for Closeout Procedures for all requirements related to Project Closeout and Substantial Completion.
- B. The CA must provide approval for Substantial Completion to the Architect before Substantial Completion can be issued.
- C. Substantial Completion in the Commissioning process requires that:
 - 1. All startup of commissioned component equipment and systems must be complete and approved
 - 2. All installation checklists are complete and approved
 - 3. Pre-Verification Tests have been completed by the Contractor.
 - 4. O&M Manuals are complete, approved, and one copy on site.
 - 5. The Training Plan is complete and approved.
 - 6. Functional Performance Testing must be scheduled, but does not need to be completed before Substantial Completion is issued.

3.5 FUNCTIONAL PERFORMANCE TEST PROCEDURES

- A. Objectives and Scope: Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected. A representative sample of each system will be tested in all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part-and full-load) where there is a specified system response. Tests will verify proper responses to standard operating modes as well as failure and alarm conditions. Specific requirements are given in other commissioned sections.
- B. Development of Test Procedures:
 - 1. Tests will be developed by the CA and will be based on the specifications and Sequence of Operations provided in these documents.
 - 2. Before the CA prepares final test procedures, the Contractor will provide to the CA all documentation and a current list of change orders affecting component equipment or systems, control sequences and parameters.
 - 3. Each subcontractor or vendor responsible for component equipment or systems being tested will provide assistance to the CA in developing the FPT procedures. This assistance will be in the form of answering questions, providing documentation, etc.
 - 4. 30 days after final submittal approval, the CA will provide a copy of the test procedures using Facility Grid to the Architect and Contractor, who will review the tests for feasibility, safety, component, and warranty protection. The contractor and Architect's Consultant will respond with approval or revisions within 2 weeks of receiving the proposed tests by using the Facility Grid app.
- C. Execution of Testing:
- D.
 - 1. FPT begins after all component equipment and systems are started up, pre-verification tests are run, and TAB and all controls work is complete.
 - 2. Testing may proceed on finished systems for which TAB has been completed before all building systems are finished at the discretion of the CA. CA must have a draft balance report for such systems before testing can proceed.
 - 3. O & M Manuals will be complete, approved by the CA and on-site for reference during FPT.

4. The Owner's Witness will attend the Functional Performance Testing
 5. The CA will document the results of all testing and maintain a log of all issues found.
 6. Address current A/E punch-lists before testing starts.
- E. Test Methods.
1. Functional performance testing and verification may be achieved by manual testing (persons manipulate the control system or component equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data-loggers.
 2. Sampling. Multiple identical pieces of non-life-safety component equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical component equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. No sampling by contractors is allowed in installation checklist or pre-verification test execution.
 - a. Sampling rates are as follow;
 - 1) If the number of identical components is three (3) or less, all components will be tested.
 - 2) If the number of identical components is greater than three (3), a twenty-five (25) percent sample will be used except, in no case will less than three (3) units be tested.
 - b. If a trend appears during testing (i.e. the same test fails on all like components) the testing will be stopped and the contractor will investigate and correct the issue. Notify the CA when ready for testing to resume. The CA will verify correction on the original sample and randomly test another sample to verify compliance.
 - c. If at any point during testing, the failures rate exceeds 10%, the CA will stop the testing and require the Contractor to perform and document a checkout and correction of the remaining units, prior to continuing with functionally testing the remaining units.
 3. Acceptance Criteria For FPT
 - a. All systems and their components must pass Functional Performance Testing at a rate of 90% or higher to be acceptable.
 - b. Systems and their components with a passing rate of 90% or higher, will be deemed acceptable. The contractor will correct all deficiencies found by the testing procedures and notify the CA when repairs are complete. The failed tests will be repeated to verify proper system operation. If the system fails any testing during the second round of tests, the contractor will correct the deficiencies and the system will be retested until all tests are passed at the contractor's expense.
 - c. Systems and their components with a passing rate of less than 90% will be deemed unacceptable. The contractor will correct all deficiencies and notify the CA when repairs are complete. The system will be retested until all tests are passed at the contractor's expense.
- F. Coordination and Scheduling. The Contractor will provide sufficient notice to the Owner's representative and CA to schedule FPT. This will be communicated through the Master Construction Schedule and updates thereto.
1. The Contractor will verify the FPT schedule with the CA not less than 14 days before FPT is to begin by delivering the pre-verification test results to the CA (using the Facility Grid app).
 2. The Owner's witness will observe and witness the FPT of all component equipment and systems.

3. Provide ladders, scaffolding, and staging as required to permit the CA & Owner's witness to directly access and observe the performance of the component equipment being tested.
 4. The contractor will provide experienced craftsmen with tools to assist the CA during FPT.
- G. Corrections of Minor Issues identified during testing may be made during the tests at the discretion of the Architect's consultant and/or the CA. In such cases the issue and resolution will be documented on the procedure form. The issue will be scored as a failure on the test form.
- H. Problem Solving. The Commissioning team may recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor and Architect.
- I. Deferred Testing
1. If during testing, the desired results cannot be produced because of seasonal conditions, Functional Performance Testing may be deferred until the environmental conditions are satisfactory for performing the test. The Owner's Representative and the CA will determine the scheduling for deferred seasonal test.
 2. The contractor will supply labor, material and equipment as required to assist the CA with the deferred testing at no additional cost to the owner. The CA will work with the Contractor to accommodate scheduling, but no more than 14 days notice will be required to the Contractor to schedule Deferred Testing.

3.6 CLOSEOUT ACTIVITIES

- A. Documentation. The CA will document the results of all functional performance tests. The CA will include the completed test forms in the Commissioning final report.
- B. Issues:
1. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the Owner's representative.
 2. As tests progress and deficiencies are identified, the CA will discuss the issues with the Contractor.
 - a. When there is no dispute on the deficiency and the Contractor accepts responsibility to correct it:
 - 1) The CA documents the deficiency.
 - 2) The contractor corrects the deficiency.
 - 3) The Contractor reschedules the test and the test is repeated.
 - b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - 1) The deficiency will be documented on the deficiency list with the contractor's response and a copy given to the Contractor and the Architect.
 - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the Architect/Engineer. Final acceptance authority is with the Project Manager.
 - 3) The CA documents the resolution process.

- 4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency and notifies the CA. The Contractor reschedules the test and the test is repeated until satisfactory performance is achieved.
 3. The Contractor will respond in writing to the Architect and CA at least as often as project meetings are being scheduled concerning the status of each outstanding issue identified during commissioning. Discussion will cover explanations of any disagreements and proposals for their resolution.
 4. The CA retains the original Issues list until the end of the project.
 5. The Contractor will not consider any required retesting by any contractor a justified reason for a claim of delay or for a time extension.
- C. Failure Due to Manufacturer Defect. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of component equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the Architect or Owner's representative. In such case, the Contractor will provide the Owner with the following:
1. Within one week of notification from the Architect or Owner's representative, the Contractor or manufacturer's representative will examine all other identical units making a record of the findings. The findings will be provided to the Architect, Owner's representative within two weeks of the original notice.
 2. Within two weeks of the original notification, the Contractor or manufacturer will provide a signed and dated, written explanation of the issue, cause of failures, etc. and all proposed solutions which will include full component equipment submittals. The proposed solutions will not significantly exceed the specification requirements of the original installation.
 3. The Architect or Owner's representative will determine whether a replacement of all identical units or a repair is acceptable.
 4. Two examples of the proposed solution will be installed by the Contractor and the Architect or Owner's representative will be allowed to test the installations for up to one week, upon which the Architect or Owner's representative will decide whether to accept the solution.
 5. Upon acceptance, the Contractor and/or manufacturer will replace or repair all identical items, at their expense and extend the warranty accordingly, if the original component equipment warranty had begun. The replacement/repair work will proceed with reasonable speed beginning within one week from when parts can be obtained.
- D. Approval.
The CA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the Architect's consultant and the CA and by the Owner's Representative, if necessary. The CA recommends acceptance of testing to the Owner's representative in his final report.
- E. Non-Conformance - Cost of Retesting.
1. The cost for the Contractor to retest a pre-functional or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the Architect.

2. For a deficiency identified during Functional Performance Testing, the following shall apply:
 - a. The Commissioning Authority and/or Owner's Representative will retest the equipment, when notified by the Contractor in writing that the deficiency has been corrected. The cost for retesting will be charged to the Contractor. The amount of the charge will be deducted from the final progress payment. These charges can include lodging, meals, travel, equipment rental, and labor costs for the Commissioning Authority and/or Owners representative.
 - b. The reason that the charges are the Contractor's responsibility are as follows:
 - 1) The Contractor approved the Functional Performance tests prior to testing.
 - 2) The Contractor and subcontractors performed pre-verification tests and the Contractor has run the tests to make sure the equipment functions.
 - 3) Any Design deficiencies discovered during the Contractor pre-verification test where identified and worked out with the Architect/Engineer prior to scheduling the Functional Performance tests.
 - c. The retesting process will be repeated until satisfactory performance is achieved. Because the Contractor has verified that the equipment is ready for retesting, each retest is subject to a charge to the Contractor, if the test fails. It is important that the Contractor verify performance before asking for a retest.
 - d. Refer to the sampling section of Division 01 91 13, Part 3.5 for requirements for testing and retesting identical equipment.

F. Owner's Instruction

1. Operation and Maintenance Manuals

- a. As part of the required submittals for the Contract, Contractor will submit a draft copy of the Operation and Maintenance Manuals within 90 days after normal submittals have been approved.
- b. Submit the draft document for review by the Owner's Representative, Architect, and Commissioning Authority to ensure completeness, proper written communications, and compliance with each reviewer's knowledge of the significant requirements. The CA will review O & M manuals for compliance with these specifications.
- c. Unacceptable Manuals will be returned to the Contractor for revision and resubmitted for review by the CA. The following information will be included in the O&M manuals:
 - 1) Tab labels will not be handwritten.
 - 2) The first page behind the component equipment tab will contain the name, address and telephone number of the manufacturer and installing contractor and the 24-hour number for emergency service for all component equipment in this section, identified by component equipment.
 - 3) There will be written manufacturer's data with the model and features of this installation clearly marked and edited to omit reference to products or data not applicable to this installation.
 - 4) Installation, startup and break-in instructions.
 - 5) All starting, normal shutdown, emergency shutdown, manual operation, seasonal changeover and normal operating procedures and data, including any special limitations.
 - 6) O&M and installation instructions that were shipped with the unit.
 - 7) Preventive maintenance and service procedures and schedules.
 - 8) Troubleshooting procedures.
 - 9) A parts list, edited to omit reference to items that do not apply to this installation.
 - 10) Lists of any special tools required to service or maintain the component equipment.
 - 11) Performance data, ratings and curves.
 - 12) Warranty, which clearly lists conditions to be maintained to keep warranty in effect and conditions that, would affect the validity of the warranty. (Final date to be added at completion)

- 13) Any service contracts issued.
- 14) Prepare written text and/or special drawings to provide necessary information, where manufacturer's standard printed data is not available and information is necessary for a proper understanding and operation and maintenance of component equipment or systems, or where it is necessary to provide additional information to supplement data included in the manual or project documents.
- 15) Provide preventive maintenance information and include condensed typewritten excerpts from the manufacturer's written instructions for weekly, monthly, quarterly, annual, etc. maintenance.
- 16) Provide condensed operating instructions, including condensed instructions for start-up, shutdown, emergency operation, safety precautions, and unusual features and troubleshooting suggestions. Where control is clearly covered in controls description, it is not to be duplicated here.
- 17) In addition, a copy of these instructions will be clearly laminated and secured adjacent to the component equipment where it can be easily read by operating personnel. These instructions will be provided for boilers, furnaces, chillers, pumps, heat rejection component equipment, large air handling units (greater than 10 tons), heat pump systems, control system, air compressors and dryers.

G. Training

1. Prepare and submit for approval a training plan. Training plan will include for each training session:
 - a. Dates, start and finish times, and locations
 - b. Outline of the information to be presented
 - c. Names and qualifications of the presenters
 - d. List of texts and other materials required to support training.
2. Training materials are due 30 days before training is scheduled to begin. This will be provided for review and approval by the CA.
3. Obtain assistance from appropriate subcontractors and vendors to provide training for the Owner's operations staff as specified in all Divisions.
4. Training will be in a classroom setting with the appropriate schematics, handouts, and audio/visual training aids.
5. Host each training session.
6. Provide program overview and curriculum guidance.
7. Obtain signatures of attendees on a sign-in list.
8. Component equipment vendors provide training on the specifics of each system and philosophy, troubleshooting, and repair techniques as specified in the relevant sections of this specification.
9. Installation subcontractors provide training on peculiarities specific to this project and job specific experience as specified in the relevant sections of this specification.
10. Deferred training will follow the same outline as above.

H. Final Completion

1. The CA will review Contractor's records of completion of commissioning requirements. Upon receiving evidence of satisfactory completion of Final Completion requirements in Division 01, the CA will submit to the Owner a recommendation to accept Final Completion.

I. Exclusions

1. The Owner's Representative and CA are not responsible for construction means, methods, job safety, or any management function related to commissioning on the job site.
2. The Contractor will provide all technician services requiring tools or the use of tools to test, adjust, or otherwise bring component equipment into a full operational state.

3.7 DOCUMENTS REQUIRED

- A. The General Contractor will provide the following documentation before Final Acceptance:
 - 1. Copy of Completed Certificate of Occupancy with approval signatures of all Authority Having Jurisdiction.
 - a. Health Department
 - b. Fire Marshall
 - c. Building Inspector
 - d. Other State or Local AHJ
 - 1) Elevator Inspector

END OF SECTION

DIVISION 02 – EXISTING CONDITIONS

Section 02 41 19 Selective Structure Demolition6

SECTION 02 41 19 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. The contractor is responsible for ascertaining the existing conditions and the work required to complete the work of this section satisfactorily.
 - 2. This Section requires the selective removal and salvage or subsequent off site disposal of the following
 - a. Portions of existing building structure and finishes indicated on drawings and as required to accommodate new work
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary" for use of premises, and phasing, and Owner-occupancy requirements.
 - 2. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 3. Division 01 Section "Cutting and Patching" for cutting and patching procedures.
 - 4. Division 01 Section "Construction Waste Management and Disposal" for disposal of demolished materials.

1.2 DEFINITIONS

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

1.3 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.4 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6 and NFPA 241.
 - 1. Review areas where existing construction is to remain and requires protection.
 - A. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
 - B. Partial Demolition and Removal:
 - 1. Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Storage or sale of removed items on site will not be permitted.
 - 2. Items to be removed by the Contractor to be retained by the Owner shall be designated "remove and retain". Remove to on-site location as directed.

1.5 PROJECT CONDITIONS

- A. Coordinate with Owner's operations involving move-out, salvage, reclamation and recycling activities
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work
- C. Partial Demolition and Removal:
 - 1. Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Storage or sale of removed items on site will not be permitted
 - 2. Items to be removed by the Contractor to be retained by the Owner shall be designated "remove and retain". Remove to on-site location as directed
- D. Protections:
 - 1. Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work
 - 2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain
 - 3. Protect existing finish work that is to remain in place and becomes exposed during demolition operations
 - 4. Protect floors and roofing with suitable coverings when necessary
 - 5. Provide temporary weatherproof closures for exterior openings resulting from demolition work
 - 6. Provide air and dust proof containment barriers at locations where work occurs, protect remainder of the building from contamination, or nuisance caused by residual effects of demolition and construction procedures
 - 7. Remove protections at completion of work
- E. Damages: Promptly repair damages caused to adjacent facilities by demolition work
- F. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
 - 1. Comply with requirements specified in Division 01 Section "Summary."
- G. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- H. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- I. Storage or sale of removed items or materials on-site is not permitted.
- J. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
- G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

- A. [Contractors are responsible for familiarizing themselves with the condition of the project site](#)
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- C. [Locate, identify, stub off, and disconnect utility services not indicated to remain. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover](#)
- D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. [Provide temporary partitions and barriers to prevent spread of dust, odors and noise. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to permit continued Owner occupancy of the building. Where selective demolition occurs, construct dust-proof partitions of minimum 4-inch studs, with gypsum wall board on non-demolition side and minimum 2 layers 3-mil plastic sheeting. Seal all seams with appropriate tape material](#)

3. Protect existing materials, existing landscaping materials, appurtenances, structures and utilities which are not to be demolished
 4. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 5. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 6. Cover and protect building improvements, furniture, equipment, and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed
 7. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
 8. At locations where demolition or tie-in to existing reinforced concrete structure is indicated, as-built drawings and x-ray analysis shall be conducted prior to demolition activities. Demolition and tie-in shall not disturb existing concrete reinforcing steel
- E. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Include all work necessary to complete the new work shown in all documents within the contract documents, including but not limited to, Architectural, Hazardous Material Abatement, Civil, Structural, Mechanical, and Electrical. Work of this section is not limited to areas indicated in the demolition drawings. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Provide services for effective air, soil and water pollution controls and worker protection as required by authorities having jurisdiction
 3. Spread out equipment and materials loads across structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing
 4. Conduct demolition to minimize interference with adjacent spaces and properties. Utilize demolition procedures that minimize disruption to the surrounding areas and activities. Conduct operations with minimum interference to public or private accesses. Maintain protected egress and access at all times. Provide all necessary measures to ensure no contamination of the existing building systems, including the building air intakes and exhausts
 5. Remove portions of the building indicated using methods as required to provide high quality substrates for work of subsequent phases. Tolerances within 1/8" of required substrate for new finishes shall be deemed acceptable for the work of this section.
 6. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 7. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 8. For interior slabs, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible
 9. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools

10. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 11. Maintain adequate ventilation when using cutting torches.
 12. Cease operations and notify Owner, and Architect/Engineer immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations
 13. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 14. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 15. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 16. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."
- B. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner within five miles of the project site.
 5. Protect items from damage during transport and storage.
- C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS
- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- 3.6 DISPOSAL OF DEMOLISHED MATERIALS
- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site. Remove demolished materials from site promptly.
 2. Remove and promptly dispose of contaminated, vermin infested or dangerous materials encountered, per regulatory requirements
 3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

- 4. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - B. Salvaged Items to be Retained and Re-Used in the Work: Where indicated as "Remove and Retain," or "Relocate", carefully remove indicated items, clean, and reuse as indicated on the drawings and in other sections of the specifications
 - C. Burning: Do not burn demolished materials.
 - D. Disposal: Transport demolished materials off Owner's property and legally dispose of them.
- 3.7 CLEANING
- A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean
 - B. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work
 - C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

DIVISION 03 – CONCRETE

Section 03 30 00 Cast-In-Place Concrete..... 12

Section 03 45 00 Precast Architectural Concrete 10

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Concrete foundations and floor slab.
 - 2. Underslab Vapor Retarders
- B. Related Sections include the following:
 - 1. Division 07 Section "Bituminous Dampproofing" for concrete foundation walls.
 - 2. Division 07 Section "Board Insulation" for perimeter foundation insulation board.
 - 3. Division 09 Section "Painting" for solid color coating and transparent sealer finishes.
 - 4. Division 31 Section "Earth Moving" for drainage fill under slab on grade.
 - 5. Division 32 Section "Concrete Paving" for concrete pavement and walks.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Curing compounds.
 - 4. Bonding agents.
 - 5. Adhesives.
 - 6. Semirigid joint filler.
 - 7. Repair materials.
 - 8. Vapor retarders.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- D. Source limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer

- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete,"
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, contractor shall submit necessary products for review.
 - 2. Manufacturers: Subject to compliance with requirements, contractor shall submit necessary products for review.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal or glass-fiber-reinforced plastic tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Welded Reinforcement Bars: ASTM A 706/A 706M, Grade 60, deformed
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
- 2.5 CONCRETE MATERIALS
- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 1. Portland Cement: **As Indicated.**
 - a. Fly Ash: **As Indicated.**
 - B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source.
 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal. 1/2 inches nominal for elevated decks.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
 - C. Water: ASTM C 94/C 94M and potable.
- 2.6 ADMIXTURES
- A. Air-Entraining Admixture: ASTM C 260.
 - B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
 - C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.
- 2.7 VAPOR RETARDERS
- A. Plastic Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 1. Available Products:
 - a. Stego Industries, LLC; Stego Wrap, 15 mils.
 - b. Fortifiers Corporation; Moistop Ultra A.
 - c. Raven Industries Inc.; Vapor Block 15.
 - d. Reef Industries, Inc.; Griffolyn Type-105.
 - e. W.R. Meadows, 15mils
 - f. Viper Vapor Check II, 15 mils
 - B. Maintain permeance of less than 0.01 Perms as tested in accordance with mandatory conditioning tests per ASTM E1745 (field condition permeance rating).
 - C. Granular Fill: All below slab gravel fill is to meet the requirements stated in Section 9-03.9(3)-Crushed Surfacing in the WSDOT Standards. Comply and verify with the requirements of the civil engineering documents. Reference requirements of the geotechnical investigation report.
- 2.8 CURING MATERIALS
- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
 - C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
 - D. Water: Potable.
 - E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating. Dayton Superior Corporation; Safe Cure and Seal (J-19),

Euclid Super Diamond Clear VOX, or equal. Certified by curing compound manufacturer to not interfere with bonding of floor covering or coatings.

1. Approved Manufacturer: W.R. Meadows

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: As Indicated.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Foundations: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: As Indicated.
 - 2. Maximum Water-Cementitious Materials Ratio: As Indicated.
 - 3. Slump Limit: 7 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 - 4. Air Content: 5 percent, plus or minus 1 percent at point of delivery.

- B. Interior Slabs: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: **As Indicated.**
 - 2. Minimum Cementitious Materials Content: 540 lb/cu. yd.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: Do not allow air content of troweled interior finished floors to exceed 3 percent. **Eliminate air for polished floor areas.**
 - 5. Maximum Water-Cementitious Materials Ratio: **As Indicated.**
- 2.13 FABRICATING REINFORCEMENT
 - A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."
- 2.14 CONCRETE MIXING
 - A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

- 3.1 FORMWORK
 - A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
 - B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
 - C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
 - D. Construct forms tight enough to prevent loss of concrete mortar.
 - E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
 - F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
 - G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
 - H. Chamfer exterior corners and edges of permanently exposed concrete.
 - I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
 - J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
 - K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
 - L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
- 3.2 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION
 - A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

1. If not otherwise indicated, extend insulation vertically a minimum of 24 inches below exterior grade line behind face of the foundation wall.
 2. Reference 07 27 00 for manufacturer requirements and insulation value.
- B. Protect insulation from displacement during follow-on construction activities, such as but not limited to, floor slab placement.

3.3 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.4 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.5 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
1. Lap joints 6 inches and seal with the manufacturer's recommended tape.
 2. Do not use stakes to hold retarder in place.
 3. Use manufacturer's mastic sealant at locations difficult to seam tape for full seal. Do not install mastic in the rain.
 4. Repair/patch all punctures with additional layer of vapor retarder. Tape entire perimeter of patch with the manufacturer's recommended tape.
 5. Seal entire perimeter of vapor retarder at backside of perimeter stem wall assembly.

3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing or 6" minimum. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
3. Joints shall be at least 25 percent of the slab thickness or at one inch deep minimum.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Re-saw all joints with beveled edge blade to ease edges at all saw-cut joints.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated. Reference civil for additional isolation joint requirements.
 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Exposed Concrete Saw Cut Joint: Reference drawings for saw cut locations and saw blade profile and contractor submitted layout drawings.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Scream slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301, 305R and as follows:
 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to public view.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete on architectural columns:
 1. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces to receive trowel finish.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 - b. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
 - D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
 - E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
 - F. Slab Finish at locations to receive Sealed or Painted Finish: Apply towel finish as specified above. After concrete has completely cured, apply sealer or paint floor finish. Patch or prepare the substrate as required by sealer and/or floor paint product requirements.
- 3.11 MISCELLANEOUS CONCRETE ITEMS
- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
 - B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- 3.12 CONCRETE PROTECTING AND CURING
- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
 - B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
 - C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
 - D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
 - E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven

- days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
- 3.13 JOINT FILLING
- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
 - B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
 - C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.
- 3.14 CONCRETE SURFACE REPAIRS
- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
 - B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
 - C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
 - D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.
- 3.15 FIELD QUALITY CONTROL
- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Reference structural drawings for additional inspections and test report information.
1. Foundation concrete does not require special inspection, but all other concrete shall be special inspected. Although foundation concrete is not special inspected, concrete testing as outlined below is required.
- B. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

- b. Cast and field cure two sets of two standard cylinder specimens for each composite sample for cold weather conditions as indicated on structural drawings.
- 6. Compressive-Strength Tests: ASTM C 39; test one cylinder of the laboratory-cured specimens at 7 days and two cylinder specimens at 28 days. The remaining test cylinder is to be held pending review of the 28 day samples. When field cured specimens are required, the same procedures for laboratory-cured specimens is to be followed.
 - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
- 7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- 8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- 11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
- 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- C. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

END OF SECTION 03 30 00

SECTION 03 45 00 - PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Architectural precast concrete units, wainscot base panels, copings, and wall cap units as defined in the drawings.
 - 2. Supports, anchors, and attachments; including all required internal steel reinforcement, embeds, weld-plates, inserts, anchors, bracing, and attachments back to the primary structure of the building.
 - 3. Perimeter and intermediate joint seals.
 - 4. Grouting under panels.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-In-Place Concrete" for installing connection anchors in concrete.
 - 2. Division 04 Section "Unit Masonry" for setting materials and installation after precast concrete panel production.
 - 3. Division 09 Section "Painting" for water-repellent finish treatments.

1.2 DEFINITION

- A. Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:
 - 1. Dead Loads: as determined by the specific construction detail
 - 2. Live Loads: 100 psf
 - 3. Seismic Loads: to comply with the project location's requirements
- B. Design Requirements:
 - 1. The products of this section shall be specifically designed by a registered structural engineer licensed in the State of Washington.
 - 2. Design units to withstand actual loads such as impact, wind, suction, deflection, and thermal movement loads.
 - 3. Design and size components to withstand seismic loads and sway displacement as calculated in accordance with the current edition of the International Building Code.
 - 4. Design units to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
 - 5. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.
 - 6. Design units to accept loads from materials that will contact, connect, or rest upon the units.
 - 7. Design lifting points and coordinate with erection sequence.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
- C. Shop Drawings: Detail fabrication and installation of architectural precast concrete units. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit. Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners.
 - 1. Indicate separate face and backup mixture locations and thicknesses.
 - 2. Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.

3. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 4. Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
 5. Include plans and elevations showing unit location and sequence of erection for special conditions.
 6. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
 7. Indicate relationship of architectural precast concrete units to adjacent materials.
 8. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Samples: For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 8 by 8 by 2 inches.
1. When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.
 2. Samples for each unit required, showing full range of color and texture expected. Include Sample showing color and texture of joint treatment. Finished units shall match existing surrounding precast units.
 - a. Grout Samples for Initial Selection: Color charts consisting of actual sections of grout showing manufacturer's full range of colors.
 - b. Grout Samples for Verification: Showing color and texture of joint treatment.
- E. Welding certificates.
- F. Qualification Data: For fabricator.
- G. Material Test Reports: For aggregates.
- H. Material Certificates: For the following items, signed by manufacturers:
1. Cementitious materials.
 2. Reinforcing materials and prestressing tendons.
 3. Admixtures.
 4. Bearing pads.
 5. Structural-steel shapes and hollow structural sections.
 6. Brick units and accessories.
 7. Stone anchors.
- I. Source quality-control test reports.
- J. Field quality-control test reports.
- 1.5 QUALITY ASSURANCE
- A. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings.
 - B. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.
 - C. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
 - D. Welding: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4, "Structural Welding Code - Reinforcing Steel."
 - E. Mockups: After sample panel approval but before production of architectural precast concrete units, construct full-sized mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockup as indicated on Drawings including sealants and architectural precast concrete complete with anchors, connections, flashings, and joint fillers.

2. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents unless such deviations are specifically approved by Architect in writing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground.
- B. Support units during shipment on non-staining shock-absorbing material.
- C. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
- D. Place stored units so identification marks are clearly visible, and units can be inspected.
- E. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.
- F. Lift and support units only at designated points shown on Shop Drawings.

1.7 SEQUENCING

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
 1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- B. Form Liners: Units of face design, texture, arrangement, and configuration to match those used for precast concrete design reference sample. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- C. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed.
- C. Steel Bar Mats: ASTM A 184, fabricated from ASTM A 615, Grade 60, deformed bars, assembled with clips.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- F. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
 1. For surfaces exposed to view in finished structure, mix gray with white cement, of same type, brand, and mill source.
- B. Supplementary Cementitious Materials:
 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.

2. Metakaolin Admixture: ASTM C 618, Class N.
3. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
 - a. Gradation: To match design reference sample.
 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate, unless otherwise approved by Architect.
- D. Lightweight Aggregates: Except as modified by PCI MNL 117, ASTM C 330, with absorption less than 11 percent.
- E. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading. Color shall match existing adjacent surrounding precast units.
- F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
- G. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- H. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
 1. Water-Reducing Admixtures: ASTM C 494/, Type A.
 2. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 3. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

2.4 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36.
- B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.
- C. Carbon-Steel Plate: ASTM A 283.
- D. Carbon-Steel Castings: ASTM A 27, Grade 60-30.
- E. High-Strength, Low-Alloy Structural Steel: ASTM A 572.
- F. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
- G. Wrought Carbon-Steel Bars: ASTM A 675/, Grade 65.
- H. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706.
- I. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563; and flat, unhardened steel washers, ASTM F 844.
- J. High-Strength Bolts and Nuts: ASTM A 325, Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563; and hardened carbon-steel washers, ASTM F 436.
- K. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123 or ASTM A 153.
 1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
 2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.
- L. Shop-Primed Finish: Prepare surfaces of nongalvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3 and shop-apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.
- M. Welding Electrodes: Comply with AWS standards.

2.5 ACCESSORIES

- A. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install architectural precast concrete units.
- B. Approved Sealers: Fabrishield 761 Silane/Siloxane Water Repellent, Grace Transeal penetrating siloxane sealer, or other as recommended by Architectural Precast Concrete product supplier
- C. Provide any required or recommended primer to allow proper seal at all caulked panel joints.

2.6 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
 - 1. Limit use of fly ash and silica fume to 20 percent of portland cement by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi minimum.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.8 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement by release agent.
- B. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
 - 1. Form joints are not permitted on faces exposed to view in the finished work.
 - 2. Edge and Corner Treatment: Uniformly chamfered.

2.9 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 - 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.
- C. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.
 - 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits

- specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
 3. Place reinforcement to maintain at least 3/4-inch minimum coverage. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 4. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 5. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
- D. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses.
 - E. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
 - F. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
 - G. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
 1. Place backup concrete mixture to ensure bond with face-mixture concrete.
 - H. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 117.
 1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
 - I. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.
 - J. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that will not show in finished structure.
 - K. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
 - L. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.
- 2.10 FABRICATION TOLERANCES
- A. Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with the following product tolerances:
 1. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:
 - a. 10 feet or under, plus or minus 1/8 inch.
 - b. 10 to 20 feet plus 1/8 inch, minus 3/16 inch.
 - c. 20 to 40 feet, plus or minus 1/4 inch.
 - d. Each additional 10 feet, plus or minus 1/16 inch.
 2. Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:
 - a. 10 feet or under, plus or minus 1/4 inch.
 - b. 10 to 20 feet, plus 1/4 inch, minus 3/8 inch.
 - c. 20 to 40 feet, plus or minus 3/8 inch.

- d. Each additional 10 feet, plus or minus 1/8 inch.
- 3. Total Thickness or Flange Thickness: Plus 1/4 inch, minus 1/8 inch.
- 4. Variation from Square or Designated Skew (Difference in Length of the Two Diagonal Measurements): Plus or minus 1/8 inch per 72 inches or 1/2 inch total, whichever is greater.
- 5. Bowing: Plus or minus L/360, maximum 1 inch.
- 6. Local Smoothness: 1/4 inch per 10 feet.
- 7. Warping: 1/16 inch per 12 inches of distance from nearest adjacent corner.
- 8. Tipping and Flushness of Plates: Plus or minus 1/4 inch
- 9. Dimensions of Architectural Features and Rustications: Plus or minus 1/8 inch.
- B. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.
 - 1. Weld Plates: Plus or minus 1 inch.
 - 2. Inserts: Plus or minus 1/2 inch.
 - 3. Handling Devices: Plus or minus 3 inches.
 - 4. Reinforcing Steel and Welded Wire Fabric: Plus or minus 1/4 inch where position has structural implications or affects concrete cover; otherwise, plus or minus 1/2 inch.
 - 5. Reinforcing Steel Extending out of Member: Plus or minus 1/2 inch of plan dimensions.
 - 6. Tendons: Plus or minus 1/4 inch, vertical; plus or minus 1 inch, horizontal.
 - 7. Location of Rustication Joints: Plus or minus 1/8 inch.
 - 8. Location of Opening within Panel: Plus or minus 1/4 inch.
 - 9. Location of Bearing Surface from End of Member: Plus or minus 1/4 inch.
 - 10. Allowable Rotation of Plate, Channel Inserts, and Electrical Boxes: 2-degree rotation or 1/4 inch maximum over the full dimension of unit.
 - 11. Position of Sleeve: Plus or minus 1/2 inch.
 - 12. Location of Window Washer Track or Buttons: Plus or minus 1/8 inch.

2.11 FINISHES

- A. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved sample panels and as follows:
 - 1. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers selected by submittal process.
 - 2. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces. Protect hardware, connections, and insulation from acid attack.
- B. Finish exposed surfaces of architectural precast concrete units to match face-surface finish.
- C. Finish unexposed surfaces of architectural precast concrete units by float finish.

2.12 SOURCE QUALITY CONTROL

- A. Strength of precast concrete units will be considered deficient if units fail to comply with ACI 318 requirements for concrete strength.
- B. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
 - 1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Architect.
 - 2. Cores will be tested in an air-dry condition.
 - 3. Strength of concrete for each series of 3 cores will be considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
 - 4. Test results will be made in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports will include the following:
 - a. Project identification name and number.
 - b. Date when tests were performed.
 - c. Name of precast concrete fabricator.

- d. Name of concrete testing agency.
 - e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- C. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting structural substrate and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Do not install precast concrete units until supporting cast-in-place building structural framing has attained minimum allowable design compressive strength or supporting steel or other structure is complete.

3.2 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.
- B. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently connected.
 - 1. Install temporary steel or plastic spacing shims or bearing pads as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
 - 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - 3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - 4. Unless otherwise indicated, maintain uniform joint widths of 3/4 inch.
- C. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
 - 1. Do not permit connections to disrupt continuity of roof flashing.
- D. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
 - 2. Welds not specified shall be continuous fillet welds, using no less than the minimum fillet as specified by AWS.
 - 3. Clean weld-affected metal surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
 - 4. Remove, reweld, or repair incomplete and defective welds.
- E. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
 - 1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.
- F. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.

Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.

3.3 ERECTION TOLERANCES

- A. Erect architectural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.
- B. Erect architectural precast concrete units level, plumb, square, and true, without exceeding the following noncumulative erection tolerances:
 - 1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch.
 - 2. Top Elevation from Nominal Top Elevation: As follows:
 - a. Exposed Individual Panel: Plus or minus 1/4 inch
 - b. Non-Exposed Individual Panel: Plus or minus 1/2 inch.
 - c. Exposed Panel Relative to Adjacent Panel: 1/4 inch.
 - d. Non-Exposed Panel Relative to Adjacent Panel: 1/2 inch.
 - 3. Support Elevation from Nominal Support Elevation: As follows:
 - a. Maximum Low: 1/2 inch.
 - b. Maximum High: 1/4 inch.
 - 4. Maximum Jog in Alignment of Matching Edges: 1/4 inch.
 - 5. Joint Width (Governs over Joint Taper): Plus or minus 1/4 inch.
 - 6. Maximum Joint Taper: 3/8 inch.
 - 7. Maximum Jog in Alignment of Matching Faces: 1/4 inch.
 - 8. Differential Bowing or Camber, as Erected, between Adjacent Members of Same Design: 1/4 inch

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Field welds will be subject to visual inspections and nondestructive testing according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS

- A. Repair architectural precast concrete units if permitted by Architect. The Architect reserves the right to reject repaired units that do not comply with requirements.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 10 feet.
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.6 CLEANING

- A. Clean surfaces of precast concrete units exposed to view.
- B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using

stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.

2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 03 45 00

DIVISION 04 – MASONRY

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| Section 04 22 00 | Unit Masonry Assemblies | 9 |

SECTION 04 21 00 - BRICK MASONRY VENEER SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Face Brick Veneer System.
 - 2. Reinforcement, anchorage, and accessories.
 - 3. Siloxane Sealer
- B. Related Sections
- C. Section 01400 - Quality Control: Testing laboratory services.
- D. Section 04100 - Mortar: Mortar and grout.
- E. Section 05120 - Structural Steel: Placement of steel lintels, bolts, and bearing plates.
- F. Section 06100 - Rough Carpentry: Structural wall backing.
- G. Section 07191 - Vapor Retarders
- H. Section 07900 - Joint Sealers: Rod and sealant at masonry joints.

1.2 REFERENCES

- A. ANSI / ASTM C216 - Facing Brick (Solid Masonry Units Made from Clay or Shale).
- B. ACI 530.1 - Specifications for Masonry Structures.
- C. ASTM E 514 - Test Method for Water Penetration and Leakage through Masonry.
- D. ASTM C 140 - Test Methods of Sampling and Testing Concrete Masonry Units.
- E. ASTM A 641 - Zinc-coated (Galvanized) Carbon Steel Wire.
- F. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.
- G. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Hot Weather Masonry Construction.
- H. 2000 IBC, Chapter 21, "Masonry".
- I. ASTM A123
- J. ASTM B117

1.3 SUBMITTALS

- A. Submit samples under provisions of Section 013300.
- B. Submit four samples of each and all specified face brick units to illustrate color, texture, and extremes of color range.
- C. Submit manufacturer's certificate under provisions of Section 014000 that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Qualifications
 - 1. Installer: Company specializing in performing the work of this Section with minimum 3 years documented experience.
- B. Mock-Ups
 - 1. Erect face brick to 4'-0" x 6'-0" panel size; include specified mortar, characteristic bond patterns, and accessories.
- C. Locate where directed, panel shall be part of a composite Mock-up including work provided under Aluminum storefront window systems provided under section 084113. Coordinate as necessary.
- D. When accepted, mock-up will demonstrate minimum standard for the Work. Mock-up may remain as part of the Work.
- E. Testing: Independent testing laboratory, under provisions of Section 014000.

- 1.5 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver products to site under provisions of Section 016000.
 - B. Store and protect products under provisions of Section 016000.
- 1.6 PROJECT/SITE CONDITIONS
 - A. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
 - B. Hot Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Hot Weather Construction.
- 1.7 SEQUENCING AND SCHEDULING
 - A. Coordinate work under provisions of Section 013100.

PART 2 PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
 - A. Mutual Materials Products: See section 2.2 below
 - 1. Robinson Brick Company Products: Equal to above, as accepted by submittal
 - 2. Interstate Brick Company Products: Equal to above, as accepted by submittal
 - 3. Substitutions: Under provisions of Section 016000.
- 2.2 MATERIALS
 - A. Face Brick: ANSI / ASTM C216, Type FBX, Grade SW;
 - 1. Colors:
 - a. BR 1 – Forrest Blend
 - 2. Texture: Mission
 - 3. Size & Shape:
 - a. Modular Face Brick 3 5/8" x 2 1/4" x 7 5/8"
 - b. Sizes & Shapes as required by building configuration for complete system
- 2.3 Bond Pattern: Running bond. Soldier course accent bands as noted in the drawings.
- 2.4 MANUFACTURED UNITS - not used
- 2.5 EQUIPMENT - not used
- 2.6 COMPONENTS
 - A. Adjustable Veneer Anchors
 - 1. Type: Two piece adjustable consisting of a minimum 11 gauge plate pintle or 1/4" diameter double leg wire pintle and a minimum 12 gauge anchor plate. The extended leg of the pintle shall have a lip or hook that will engage or enclose a horizontal 9 gauge joint reinforcement wire.
 - 2. Size: as required to extend to within 3/4" of outside face of masonry veneer.
 - 3. Fasteners: Minimum of two fasteners per anchor plate.
 - 4. Sleeve anchors: At concrete and CMU sleeve anchors shall be stainless steel 1/4" diameter with a minimum of 1-1/8" embedment. Acceptable sleeve anchor:
 - a. Phillips Drill Co., Inc., Red Head Sleeve Anchor
 - 5. Finish: All material, pintle, and anchor plate shall be hot dipped galvanized with a minimum of 1.5 oz. of zinc per square foot of surface area per ASTM A 123. Fasteners shall be organic polymer coated with salt-

- spray resistance to red rust of more than 800 hours per ASTM B 117. Approved coating shall be "Stalgard".
6. Structural Performance: provide test data certifying that the veneer anchors meet or exceed the following service criteria.
 - a. Minimum Tension/Compression 175 lbs.
 - b. Minimum Axial Stiffness 2,000 lbs. per inch
 - c. Maximum Axial Deflection 0.09 inch
 - d. Maximum Axial Mechanical Play 0.05 inch
 - e. Minimum Lateral Mechanical Play 0.25 inch
 7. Test shall include a minimum of 5 samples and be conducted by an approved independent testing agency.
 8. The testing apparatus shall simulate, as closely as possible, the loading of the veneer anchor under service conditions, and shall include all components, including all adjustment eccentricities.
 9. Tension/compression tests shall be conducted to failure and when divided by a factor of safety of 4 shall meet or exceed the specified service minimum force.
 10. Measurements for specified deformation maximums shall be made under service loads.
 11. Acceptable Products:
 - a. Thermal Concrete 2-Seal Tie with Byna-Lok Wire Tie and 9 gauge continuous wire as manufactured by Hohman & Barnard, Inc.
 - b. HB-213S Seismic Plate Pintle w/ HB-213 (T-LOK TIE) and 9 gauge continuous wire as manufactured by Hohman & Barnard, Inc.
 - c. X-Seal S.I.S. and 9 gauge continuous wire as manufactured by Hohman & Barnard, Inc.
 12. Substitutions: Under provisions of Section 016000.

2.7 ACCESSORIES

- A. Joint Filler: Closed cell polyethylene; oversized 50 percent joint width; self-expanding; 1 inch wide by maximum lengths.
- B. Building Wrap: 30 pound asphalt saturated felt.
- C. Weep Holes: vertical joint blockout at 24" on center.
- D. Cleaning Solution: Fabrikleen Masonry Cleaner Type R, or as recommended by selected Masonry product supplier.
- E. Flashing: Copper flashing with caulked sealed lap joints.
- F. Flexible Base Flashing: 3 ounce copper sheet laminated with bituminous impregnated Kraft paper or saturated fabric flashing with caulked sealed lap joints.
- G. Approved Masonry Sealers: Fabrishield 761 Silane/Siloxane Water Repellent, or other previously approved as recommended by selected Masonry product supplier. Apply two (2) coats per mfr., each coat saturated to refusal.
- H. Provide weep screed.

2.8 MIXES - not used

2.9 FABRICATION - not used

2.10 SOURCE QUALITY CONTROL

- A. Testing: Independent testing laboratory, under provisions of Section 014000.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- D. Beginning of installation indicates installer accepts existing conditions.

3.2 PREPARATION

- A. Direct and coordinate placement of anchors supplied to other Sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 EXECUTION

- A. Installation
 - 1. Establish lines, levels, and coursing as indicated in drawings. Protect from displacement.
 - 2. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
 - 3. Provide veneer ties as required by structural and 2000 International Building Code requirements. At a minimum space ties at 16" o.c. vertically and 16" o.c. horizontally. Stagger placement.
 - 4. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
 - 5. Remove excess mortar as Work progresses.
 - 6. Interlock intersections and external corners.
 - 7. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- B. Perform job site cutting or masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- C. Masonry control joints to be a maximum of 20 feet o.c., unless indicated otherwise on the drawings. All joints to be sanded. Contractor to submit layout for approval.
- D. Interface with Other Products
 - 1. As work progresses, build in fabricated metal frames, anchor bolts and other items furnished by other Sections.
 - 2. Build in items plumb and level.
 - 3. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 4. Do not build in organic materials subject to deterioration.
- E. Tolerances
 - 1. Maximum Variation from Alignment of Columns: 1/4 inch.
 - 2. Maximum Variation from Unit to Adjacent Unit: 1/32 inch.
 - 3. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
 - 4. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
 - 5. Maximum Variation from Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
 - 6. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.
 - 7. Maximum Variation From Cross Sectional Thickness of Walls: 1/4 inch.
- F. Cutting and Fitting

1. Cut and fit for pipes and conduit. Coordinate with other Sections of work to provide correct size, shape, and location.
2. Obtain Architect / Engineer approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.4 FIELD QUALITY CONTROL - not used

3.5 ADJUSTING - not used

3.6 CLEANING

- A. Remove excess mortar and mortar smears.
- B. On exterior of building clean masonry daily to remove mortar on surface.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.
- F. Upon completion of masonry cleaning apply specified masonry sealer in accordance with manufacturer's written recommendations.

3.7 DEMONSTRATION - not used

3.8 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

END OF SECTION 04 21 00

SECTION 04 22 00 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
 - 1. Concrete masonry units (CMUs).
 - 2. Mortar and grout.
 - 3. Reinforcing steel.
 - 4. Miscellaneous masonry accessories.
- B. Related Sections include the following:
 - 1. Division 01 Section "Quality Requirements" for special building envelope mock-up.
 - 2. Division 05 Section "Metal Fabrications" for weld and bearing plates.
 - 3. Division 07 Section "Spray Insulation" for masonry unit insulation.
 - 4. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashing.
 - 5. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.
 - 6. Division 09 Section "Painting" for clear sealer finish.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: 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." Show elevations of reinforced walls.
 - 2. Elevation drawings for each face of masonry on the project indicating patterning, bond type, control joints and block type and size for each area. Include notations for special shapes or cutting required.
- C. Samples for Final Selection in the form of small-scale units: For the following:
 - 1. Concrete masonry units showing match to pre-selected colors
- D. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.
 - 1. For masonry units include material test reports substantiating compliance with requirements.
- E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths (f'_m) at 28 days.
Determine net-area compressive strength (f'_m) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.4 QUALITY ASSURANCE

- A. Source Limitations for Masonry Units: Obtain exposed 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. Acceptable concrete masonry unit manufacturers must have five years minimum experience.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- C. Conform to International Masonry Industry All Weather Council (IMIAC) when placing masonry in cold weather.
 - 1. Maintain mortar temperatures between 40°F and 120°F at the time of mixing.

2. Produce grout temperatures between 70°F and 120°F at the time of mixing.
 3. Protect materials from moisture and freezing.
 4. Eliminate installation of frozen units (those with temperatures 20°F and below).
 5. Protect the completed, or partially completed, masonry for the prescribed period of time to prevent freezing of mortar and grout, and the intrusion of excess water from rain or snow.
- D. Conform to International Masonry Industry All Weather Council (IMIAC) when placing masonry in hot weather.
- E. Mock-up:
1. Erect sample mock-up installation for masonry types to be installed on the project:
 - a. Custom block type and coursing.
 2. Do not proceed with purchase, fabrication or installation of multiple items until mock-up has been accepted.
 3. Locate where directed. Coordinate as necessary.
 4. When accepted, mock-up will demonstrate minimum standard for the Work. Mock-up may remain as part of the Work.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Store masonry units 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.
 - B. 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.
 - C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- 1.6 PROJECT CONDITIONS
- A. Protection of Masonry: 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.
 - B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry 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 spreading coverings 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.
 - C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with industry standards cold-weather construction requirements.
 - D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to:
 1. Western Materials

2. Oldcastle
3. Mutual Materials Co.
4. White Block
5. Builders Masonry Products
6. Central Premix
7. Amcor
8. Substitutions: Under provisions of Division 01

2.2 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.3 CONCRETE MASONRY UNITS (CMUs)

- A. Concrete Masonry Units: ASTM C 90.
 1. Provide special shapes for sill, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide square-edged units for outside corners, unless otherwise indicated in the construction documents.
 3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi **or as indicated on structural drawings.**
 4. Weight Classification: Medium weight **or as indicated on structural drawings.**
- B. CMU Schedule: Refers to typical sizes, face pattern and color only. Refer to plans, sections, and wall types to determine depth, type, and any special required shapes or configurations.
 1. **Standard Grey Units**

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
- D. Mortar Cement: ASTM C 1329.
- E. Mortar Pigments: None.
- F. Aggregate for Mortar: ASTM C 144.
- G. Aggregate for Grout: ASTM C 404.
- H. Water: Clean and Potable.

2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60, deformed.

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with subparagraphs below, unless otherwise indicated.
 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
 2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
 3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.

2.7 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane.
- B. Preformed Control-Joint Gaskets: Designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. 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. Provide units with either two loops or four loops as needed for number of bars indicated.
 - 1. Available Products:
 - a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
 - b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
 - c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
 - 2. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.
- E. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials
- F. Provide and install mortar net with pre-formed weep holes.
- G. Weep/Vent Products: Use the following, unless otherwise indicated:
 - 1. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
- H. Provide thru-wall termination bar flashing at wall substrate transitions, stainless steel or copper.
 - 1. Seal weather barrier at metal termination bars with Kraft Paper flashing 3 oz/sq ft sheet copper bonded to fiber reinforced asphalt treated Kraft paper. Lap butyl sealant as specified in Division 07.
- I. **Approved Masonry Sealers: Tnemec Silane/Siloxane Water Repellent, or other previously approved product as recommended by selected Masonry product supplier. Apply two coats by tank sprayer. Apply to 4" run-down each coat.**

2.9 MORTAR AND GROUT 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.
 - 2. Limit cementitious materials in mortar to portland cement and lime.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. For masonry, use Type S.
 - 2. Mortar Mixing
 - a. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270
 - b. Do not use antifreeze compounds to lower the freezing point of mortar or grout
- C. Grout for Unit Masonry: Comply with ASTM C 476
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

2. Bond beams and lintels: 2000 psi strength at 28 days; 7-8 inches slump, premixed type in accordance with ASTM C94
3. Provide grout with a slump of 8 inches as measured according to ASTM C 143

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
- C. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.
- E. Preparation
 1. Supply metal anchors for placement. Direct correct placement
 2. Obtain door frames and related embedded anchors. Verify items provided by other sections of work are properly sized and located
 3. Establish lines, levels, and coursing. Protect from disturbance
 4. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing

3.2 INSTALLATION, GENERAL

- A. Install all masonry material in compliance with Industry Standards and as indicated and shown in the construction documents.
- B. Install all masonry material in compliance with weather conditions.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 1. Mix units from several pallets or cubes as they are placed.
- D. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- E. Build chases and recesses to accommodate items specified in this and other Sections.
- F. Coordinate masonry installation with exterior continuous wall insulation and water-resistive barrier. Reference Division 07 specifications and drawings.
- G. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- H. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- I. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 1. Mix units from several pallets or cubes as they are placed.
- J. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
 1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
 2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
 4. 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.
 5. 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.
 6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/32 inch except due to warpage of masonry units within tolerances specified for warpage of units.
- K. Cold-Weather Construction:
1. General: All materials shall be delivered in a usable condition and stored to prevent wetting by capillary action, rain and snow. The tops of all walls not enclosed or sheltered shall be covered with a strong weather-resistive material at the end of each day or shutdown. Partially completed walls shall be covered at all times when work is not in progress. Covers shall be draped over the wall and extend a minimum of 2 feet down both sides and shall be securely held in place, except when additional protection is required.
 2. Preparation: If ice or snow has inadvertently formed on a masonry bed, it shall be thawed by application of heat carefully applied until top surface of masonry is dry to the touch. A section of masonry deemed frozen and damaged shall be removed before continuing construction of that section.
 3. Construction: Masonry units shall be dry at time of placement. Wet or frozen masonry units shall not be laid. Special requirements for various temperature ranges are as follows:
 - a. Air temperature 40 deg F to 32 deg F: Sand or mixing water shall be heated to produce mortar temperature between 60 deg F and 120 deg F
 - b. Air temperature 32 deg F to 25 deg F: Sand and mixing water shall be heated to produce mortar temperatures between 60 deg F to 120 deg F. Maintain mortar temperatures on boards above freezing
 - c. Air temperature 25 deg F to 20 deg F: Sand and mixing water shall be heated to produce mortar temperatures between 60 deg F to 120 deg F. Maintain mortar temperatures on boards above freezing. Salamanders or other source of heat shall be used on both sides of walls under construction. Windbreaks shall be employed when wind is in excess of 15 miles per hour. Temperature of units when laid shall not be less than 40 deg F
 - d. Air temperature 20 deg F and below: Sand and mixing water shall be heated to produce mortar temperatures between 60 deg F to 120 deg F. Enclosure and auxiliary shall be provided to maintain air temperature above freezing. Temperature of unit when laid shall not be less than 40 deg F
 4. Protection when the mean daily air temperature is 40 deg F to 32 deg F, masonry shall be protected from rain or snow for 24 hours by covering with a weather-resistive membrane.
 5. When the mean daily air temperature 32 deg F to 25 deg F, masonry shall be completely covered with weather-resistive membrane for 24 hours
 6. When the mean daily air temperature 25 deg F to 20 deg F, masonry shall be completely covered with insulating blankets or equally protected for 24 hours
 7. When the mean daily air temperature is 20 deg F or below, masonry temperature shall be maintained above freezing for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps or other approved methods
 8. Placing grout and protection of grouted masonry. When air temperatures fall below 40 deg F, grout mixing water and aggregate shall be heated to produce grout temperatures between 60 deg F to 120 deg F. Masonry to be grouted shall be maintained above freezing during grout placement and for at least 24 hours after placement. When

atmospheric temperatures fall below 40 deg F, enclosures shall be provided around the masonry during grout placement and for at least 24 hours after placement.

9. Any expert opinions regarding acceptability of the installed units and mortar required by the Architect/Engineer shall be at the Contractors cost

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Masonry: Unless otherwise indicated, lay masonry in running bond or as indicated on Drawings.
- C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- G. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

3.5 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.6 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement. Joint spacing shall be provided at 24 feet o.c. minimum. Reference architectural and structural drawing for additional locations as shown on drawings.

3.7 WEEP HOLES, AND CAVITY DRAINAGE

- A. General: Install weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where
- B. Install weep holes in head joints in exterior wythes of first course of masonry.
 - 1. Space weep holes 24 inches o.c., unless otherwise indicated.

3.8 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, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Protection
 - 1. Maintain protective boards at exposed external corners which may be damaged by construction activities
 - 2. Provide protection without damaging completed work
 - 3. At day's end, cover unfinished walls to prevent moisture infiltration
- E. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of 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 or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.9 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.
 - 3. Place and consolidate grout fill without disturbing reinforcing
 - 4. Fill all reinforced cells with grout

3.10 FIELD QUALITY CONTROL

- A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.
 - 1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.
 - 2. Allow and coordinate special inspections as defined in Structural drawings.
- B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:
 - 1. Payment for these services will be made by Owner.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- D. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.
- E. Mortar Test (Property Specification): For each mix provided, per ASTM C780. Test mortar for compressive strength.
- F. Grout Test (Compressive Strength): For each mix provided, per ASTM 1019.

END OF SECTION 04 22 00

DIVISION 05 – METALS

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SECTION 05 12 00 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Structural steel
 - 2. Base plates, anchor bolts, and shims
 - 3. Grout.

1.2 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
- C. Welding certificates.
- D. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
 - 1. Structural steel including chemical and physical properties.
 - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 3. Shop primers.
 - 4. Nonshrink grout.

1.4 QUALITY ASSURANCE

- A. Qualifications
 - 1. Fabricator: Company specializing in performing the work of this Section with minimum 5 years documented experience
 - 2. Erector: Company specializing in performing the work of this Section with minimum 5 years documented experience
- B. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings
- C. Perform work in accordance with AISC-Specification for Architecturally Exposed Structural Steel (AESS) where finished work will be exposed to view that are within 96 inches vertically and 36 inches horizontally of a walking surface.
- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel."
- E. Acceptance: Metal fabrications exposed to view that are within 96 inches vertically and 36 inches horizontally of a walking surfaces shall be of the highest quality and in accordance with applicable portions of AISC (American Institute of Steel Construction) - Specification for Architecturally Exposed Structural Steel (AESS). Quality of appearance shall be grounds for acceptance or rejection of the work of this section, decisions regarding appearance quality shall be at the discretion of the architect / engineer

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Load structural members or assembled units in such a manner that they may be transported and unloaded without being excessively stressed, deformed or otherwise damaged.

- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
 - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.6 COORDINATION

- A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992.
- B. Channels, Angles, Plate and Bar: ASTM A 36.
- C. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- D. Steel Pipe: ASTM A 53, Grade B.
- E. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
- C. Anchor Rods: ASTM F1554 Grade 36.
 - 1. Nuts: ASTM A 563 heavy hex carbon steel.
 - 2. Plate Washers: ASTM A 36 carbon steel.
 - 3. Washers: ASTM F 436 hardened carbon steel.
- D. Threaded Rods: ASTM A 36
 - 1. Nuts: ASTM A 563 heavy hex carbon steel.
 - 2. Plate Washers: ASTM A 36 carbon steel.
 - 3. Washers: ASTM F 436 hardened carbon steel.
- E. Headed Studs: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

2.3 PRIMER

- A. Primer: SSPC-Paint 25, iron oxide, zinc oxide, raw linseed oil, and alkyd.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's Specification for Structural Steel Buildings--Allowable Stress Design.
 - 1. Camber structural-steel members where indicated.

2. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
 3. Mark and match-mark materials for field assembly.
 4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Architecturally Exposed Structural Steel (AESS): Fabricate and assemble in shop to greatest extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection. In addition to special care used to handle and fabricate AESS, comply with the following:
1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 2. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and edges.
 3. Fabricate with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identifications.
 4. Fabricate with exposed surfaces free of seams to maximum extent possible.
 5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
 7. Seal-weld open ends of hollow structural sections with 3/16-inch closure plates.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- 2.6 SHOP CONNECTIONS
- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: **As Indicated.**
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
- 2.7 SHOP PRIMING
- A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
- D. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of concrete-bearing surfaces and locations of anchor rods, bearing plates, and other embedment's, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design."
- B. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- C. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
- D. Splice members only where indicated.
- E. Do not use thermal cutting during erection.
- F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- G. Touch- up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of the shop paint. Apply paint to exposed areas with the same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 1.0 mils

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: **As Indicated.**
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - 1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections and fabrication shop weld, unless the shop utilized is AISC certified.
 - 1. Allow and coordinate special inspections as defined in Structural drawings.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories and abutting structural steel.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION 05 12 00

SECTION 05 30 00 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Composite floor deck.

1.2 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product certificates.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Research/Evaluation Reports: For steel deck.

1.3 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- B. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- C. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Epic Metals Corporation
 - 2. New Millennium Building Systems: Metal Dek Group
 - 3. ASC Profiles, Inc.
 - 4. Canam Steel Corp.; The Canam Manac Group.
 - 5. Nucor Corp.; Vulcraft Division.
 - 6. Verco Manufacturing Co.

2.2 COMPOSITE FLOOR DECK

- A. Composite Steel Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
2. Profile Depth: As indicated.
3. Design Uncoated-Steel Thickness: As indicated.

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws where permitted on the structural drawings.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter where permitted on the structural drawings.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber, at all perimeter locations.
- E. Pour Stops: Unless noted otherwise provide bent sheet metal concrete pour stops at edge of framed openings.
- F. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

2.4 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from decking and accessories. Apply 1 coat of shop primer - grey.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, requirements in this Section, and as indicated.
- B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks. Deck panel lengths shall be a minimum of two spans.
- C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- G. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- H. End Bearing: Install deck ends over supporting frame with a minimum end bearing as indicated.
- I. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- J. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- K. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

- L. Sound-Absorbing Insulation: Factory/Shop installation into topside ribs of deck to achieve NRC ratings indicated. Do not expose filler strips to moisture.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.3 REPAIRS

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 05 30 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Steel supports for overhead supported doors.
 - 2. Steel supports for countertops.
 - 3. Steel framing and supports for mechanical and electrical equipment.
 - 4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 5. Gutter support strap brackets
 - 6. Aluminum Trim Members at Overhead Supported Door jamb and head locations.
 - 7. Stainless Steel Trim Members at Overhead Supported Door jamb and head locations.
 - 8. Lintels.
 - 9. Loose bearing and leveling plates.
 - 10. Miscellaneous steel trim including edge angles.
 - 11. Metal ladders.
 - 12. Metal bollards
 - 13. Abrasive metal stair nosing.
- B. Products furnished, but not installed, under this Section include the following:
 - 1. Loose steel lintels.
 - 2. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
- C. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
 - 2. Division 04 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items indicated to be built into unit masonry.
 - 3. Division 05 Section "Structural Steel Framing."
 - 4. Division 05 Section "Pipe and Tube Railings."
 - 5. Division 06 Section "Rough Carpentry" for metal framing anchors.
 - 6. Division 09 Section "Painting" for various metal finishes.

1.2 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Perforated Metal panel product.
 - 2. Paint products.
 - 3. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

- C. Samples for Verification: For each type and finish of extruded nosing.
- D. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.
- E. Welding certificates.

1.4 QUALITY ASSURANCE

- A. **Qualifications**
 - 1. Fabricator: Company specializing in performing the work of this Section with minimum 5 years documented experience
 - 2. Erector: Company specializing in performing the work of this Section with minimum 5 years documented experience
- B. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings
- C. Perform work in accordance with AISC-Specification for Architecturally Exposed Structural Steel (AESS) where finished work will be exposed to view that is within 96 inches vertically and 36 inches horizontally of a walking surface.
- D. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.2, "Structural Welding Code--Aluminum."
 - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
 - 4. AWS D1.6, "Structural Welding Code--Stainless Steel."
- E. **Acceptance:** Metal fabrications exposed to view shall be of the highest quality and in accordance with applicable portions of AISC (American Institute of Steel Construction) - Specification for Architecturally Exposed Structural Steel (AESS). Quality of appearance shall be grounds for acceptance or rejection of the work of this section, decisions regarding appearance quality shall be at the discretion of the architect / engineer. Work that is rejected on the grounds of appearance shall be repaired or replaced with no additional cost to Owner.
- F. **Mock-up:**
 - 1. Erect sample mock-up installation for each fabrication type to be installed on the project, include supports, rails, panels, characteristic patterns, and accessories. provide the following:
 - a. Exterior canopy and entry assemblies
 - b. Gutter support bracket, coordinate with Division 07 Gutters
 - 2. Do not proceed with purchase, fabrication or installation of multiple items until mock-up has been accepted.
 - 3. Locate where directed. Coordinate as necessary
 - 4. When accepted, mock-up will demonstrate minimum standard for the Work. Mock-up may remain as part of the Work

1.5 PROJECT CONDITIONS

- A. **Field Measurements:** Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.6 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

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

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.
- E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- F. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- G. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- H. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: **ASTM B 209**, Alloy 6061-T6.
- B. Aluminum Extrusions: **ASTM B 221**, Alloy 6063-T6, schedule 40 minimum.
- C. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at locations concealed inside of exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, **ASTM A 307, Grade A** with hex nuts, **ASTM A 563**; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; **ASTM F 593** for bolts and **ASTM F 594** for nuts, Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: **ASME B18.6.3**.
- G. Lag Bolts: **ASME B18.2.1**.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, **ASME B18.22.1**.
- J. Lock Washers: Helical, spring type, **ASME B18.21.1**.
- K. Cast-in-Place Anchors in Concrete: **As indicated on drawings**.
- L. Expansion and Adhesive Anchors: **As indicated on drawings**.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Division 09 painting Sections.

- C. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
 - 1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Available Products:
 - a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
 - b. Carboline Company; Carbozinc 621.
 - c. ICI Devoe Coatings; Catha-Coat 313.
 - d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
 - e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
 - f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
 - g. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20. If painting work occurs within the interior of the building, paint shall comply with VOC limits stated in Section 01 81 14.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187. If painting work occurs within the interior of the building, paint shall comply with VOC limits stated in Section 01 81 14.
- F. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- H. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of **3000 psi**, unless otherwise indicated.

2.6 FABRICATION, GENERAL

- A. Workmanship:
 - 1. Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components or work
 - 2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work
- B. Form exposed connection with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not show, socket type flat-head (countersunk) screws or bolts. Provide sufficient backing at screw locations to cover at least three threads
- C. Provide for anchorage of type suitable for use with supporting structure. Fabricate and space anchoring devices as shown and as required to provide adequate support for intended use
- D. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- E. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch**, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- F. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- G. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- H. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - I. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
 - J. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
 - K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
 - L. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, **1/8 by 1-1/2 inches**, with a minimum **6-inch** embedment and **2-inch** hook, not less than **8 inches** from ends and corners of units and **24 inches** o.c., unless otherwise indicated.
- 2.7 MISCELLANEOUS FRAMING AND SUPPORTS
- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
 - B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 1. Fabricate units from slotted channel framing where indicated.
 2. Furnish inserts if units are installed after concrete is placed.
 - C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
 - D. Galvanize miscellaneous framing and supports where indicated.
 - E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.
- 2.8 GUTTER SUPPORT STRAP BRACKETS
- A. Fabricate steel gutter support brackets from 3/16" x 1-1/2" x length required for gutter profile and attachment to building structure. Form bracket to match gutter shape.
 - B. Place gutter support brackets at 34" on center at all gutters (align with standing seam at metal roof panels where used).
 - C. Field weld to structural steel with 3/16" continuous fillet weld or bolt into wood sheathing with 3/16" diameter lag bolts (2 bolts per strap minimum).
 - D. Finish shall be shop applied powder coat finish with rust inhibitor, color to match exact gutter finish.
- 2.9 SHELF ANGLES and LOOSE STEEL LINTELS
- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive **3/4-inch** bolts, spaced not more than **6 inches** from ends and **24 inches** o.c., unless otherwise indicated on drawings.
 1. Provide mitered and welded units at corners.
 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately **2 inches** larger than expansion or control joint.
 - B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
 - C. Galvanize shelf angles located in exterior walls.
 - D. Prime shelf angles located in exterior walls with zinc-rich primer.
 - E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.10 ALUMINUM DOOR TRIM MATERIAL AT OVERHEAD DOORS

- A. Fabricate aluminum door trim members from 1/16" thick x length required for profile. Form trim member to match required shape. Joints shall only be allowed at right angle corners of the frame.
- B. Finish shall be clear anodized mill aluminum finish, color and texture to match architect's sample.

2.11 STAINLESS STEEL TRIM MATERIAL AT OVERHEAD DOORS

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices. Fabricate stainless steel door trim from 1/16" thick x length required for profile. Fully enclose jamb and head of rough opening for complete coverage.
- B. Provide cutouts, fittings, and anchorages to coordinate assembly with adjacent equipment and finishes.
- C. Finish shall be stainless steel, Bright - Directional Satin Finish: No. 4. Match architect's sample.

2.1 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime interior miscellaneous steel trim, with zinc-rich primer.

2.2 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates after fabrication.
- C. Prime plates with zinc-rich primer.

2.3 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates, shims, spacers and angles not specified in other Sections, for items supported from concrete and/or steel construction as needed to complete the Work.

2.4 VERTICAL METAL LADDERS

- A. General:
 - 1. Comply with ANSI A14.3, unless otherwise indicated.
 - 2. Comply with OSHA 3124-12R 2003. Provide all required safety devices and equipment for fixed ladders.
 - 3. Space side rails 24 inches apart, unless otherwise indicated.
 - 4. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted brackets, made from same metal as ladder.
- B. Steel Ladders:
 - 1. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
 - 2. Rungs: 1-inch- round steel bars.
 - 3. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 - 4. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
 - 5. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung by a proprietary process.
 - 6. Galvanize exterior ladders, including brackets and fasteners.
 - 7. Prime interior ladders, including brackets and fasteners, with zinc-rich primer.

2.5 ABRASIVE METAL NOSINGS

- A. Extruded Units: Aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in sizes and configurations indicated and in lengths necessary to accurately fit openings or conditions. Install/recess abrasive metal stair nosing at all exposed concrete stairs – exterior.
 - 1. Available Manufacturers:
 - a. Basis of Design: **Wooster Products Inc.**
 - 1) **Product: Stairmaster 511, full width of stair step**
 - b. ACL Industries, Inc.
 - c. American Safety Tread Co., Inc.
 - d. Amstep Products.
 - e. Armstrong Products, Inc.
 - f. Balco Inc.
 - g. Granite State Casting Co.
 - 2. Provide ribbed units, with abrasive filler strips projecting **1/16 inch** above aluminum extrusion.
 - 3. Provide solid-abrasive-type units without ribs.
- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- C. Drill for mechanical anchors and countersink. Locate not more than **4 inches** from ends and not more than **12 inches** o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.
- D. Apply bituminous paint to concealed bottoms, sides, and edges of cast-metal units set into concrete.
- E. Apply clear lacquer to concealed bottoms, sides, and edges of extruded units set into concrete.

2.6 METAL BOLLARDS

- A. Fabricate metal bollards from 6" diameter, Schedule 40 steel pipe.
 - 1. Fill bollards with **concrete grout, with rounded top as indicated in the drawings.**
- B. Fabricate sleeves for bollard anchorage from steel pipe with **1/4-inch-** thick steel plate welded to bottom of sleeve. Make sleeves not less than **8 inches** deep and **3/4 inch** larger than OD of bollard.

2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. At all steel fabrications that will be exposed to the exterior upon completion of the project, steel fabrications shall be galvanized, and prepared for field painting
- D. At all steel fabrications that will be at interior locations, steel fabrications shall be shop primed.

2.8 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 153, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.9 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Bright, Directional Satin Finish: No. 4. Verify with Architect.
- D. Dull Satin Finish: No. 6. Verify with Architect.
- E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
 - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 INSTALLING METAL BOLLARDS

- A. Anchor bollards to existing construction with expansion anchors. Provide four **3/4-inch** bolts at each bollard, unless otherwise indicated.
 1. Embed anchor bolts at least **4 inches** in concrete.
- B. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete in formed or core-drilled holes not less than **8 inches** deep and **3/4 inch** larger than OD of bollard. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately **1/8 inch** toward bollard.
- C. Fill bollards solidly with concrete, mounding top surface to shed water.
 1. Do not fill removable bollards with concrete.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 05 51 36 - PREFABRICATED MODULAR ALUMINUM PLATFORM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Prefabricated modular platforms.

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 05 50 00 - Metal Fabrications.
- C. Section 05 52 13 - Pipe and Tube Railings.

1.3 REFERENCES

- A. OSHA 1910.28: Duty to have fall protection and falling object protection
- B. OSHA 1910.29: Fall protection Systems and falling object protection - criteria and practices
- C. ANSI A1264.1: Safety requirements for Workplace Walking/Working Surfaces and Their Access

1.4 SUBMITTALS

- A. Delegated Design: For prefabricated aluminum platform and guardrail systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified profession engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of aluminum-framed systems.
 - 2. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 3. Include design calculations.
- B. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- C. Product Data:
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.
- D. Verification Samples: Two representative units of each type, size, pattern and color.
- E. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and

complexity.

- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

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 recommended limits.

1.8 WARRANTY

- A. Manufacturer's standard limited warranty unless indicated otherwise.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- 1. Acceptable Manufacturer: Hydro Extrusion USA, LLC (REDD Team)
125 Superior Drive Delhi, LA 71232, Tel: 800-779-5509, www.reddteam.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 PREFABRICATED MODULAR ALUMINUM PLATFORMS

- A. Basis of Design: Prefabricated Modular Platforms as supplied by REDD Team.
 - 1. An engineered, modular system. Easily customized with re-usable components. Made for on-site assembly. Sturdy, Heavy Duty, Aluminum Construction. Suited for free-standing construction where required.
 - 2. Capacity: Support a minimum live load of 100 lbs per square foot a concentrated vertical load of 300 pounds distributed uniformly over an area of 1 square foot.
 - 3. Components:
 - a. Platform:
 - 1) Surface: 6000 series aluminum alloy with 6061-T6 for primary structural components
 - 2) Platform: 1-1/2" x 6" or 1-1/2" x 8" self mating aluminum deck with extruded slip resistant surface.
 - 3) Legs: Aluminum construction alloy 6061-T6. All fasteners shall be grade 304 stainless steel. Legs shall telescope and allow for height and slope adjustments. The legs shall be design so that they will be perpendicular to the ground and vertical loads are transmitted axially through them regardless of the slope. Legs shall have 1/4" x 6" x 10" pads.
 - 4. Guardrail and Hand Railings:
 - a. Top Rail: 2in round 6005-T5 aluminum top rail.
 - b. Mid Rail: KATTGUARD 1-5/8 inch (41 mm) 6005-T5 round aluminum mid rail.
 - c. Posts: Side Mount Posts, Aluminum Rectangular hollow extrusion with

welded mounting plates. Finished height to be 42 inches (1067 mm).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly constructed and prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Dissimilar Metals:
 - 1. Aluminum to Concrete: To be painted with a bitumen paint.
 - 2. Aluminum to Roof Deck: Shall be separated with EPDM tape.
 - 3. Aluminum to Stainless Steel: Brackets to be powder coated or EPDM separated.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
- B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.5 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturers recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 05 51 36

SECTION 05 52 00 - METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Exterior steel pipe handrails, Schedule 40 minimum, field painted.
 - 2. Interior steel pipe handrails and guardrails, Schedule 40 minimum, field painted.
- B. See Division 06 Section "Interior Finish Carpentry" for wood trim.
- C. See Division 09 Section "Painting" for exposed steel painting.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: For all rails, provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails:
 - a. Uniform load of 100 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Top Rails of Guards:
 - a. Uniform load of 100 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 3. Infill of Guards:
 - a. Uniform load of 25 lbf/sq. ft. applied horizontally or 200 lbf/sq. ft. concentrated applied horizontal on 1 sq ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

- A. Product Data: For grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples: For each exposed finish required.
- D. Welding certificates.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with the following requirements:
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities. Comply with all requirements including, but not limited to, the following:
 - a. Location: Handrails shall be provided on both sides of stairs and ramps.
 - b. Continuity: Handrails shall be continuous within the full length of each stair flight or ramp run. Inside handrails on switchback or dogleg stairs or ramps shall be continuous between flights or runs. Other handrails shall comply with bottom and top extensions defined below.
 - c. Height: Top of gripping surfaces of handrails shall be 34 inches minimum and 38 inches maximum vertically above stair nosings, ramp surfaces and walking surfaces. Handrails shall be at a consistent height above stair nosings, ramp surfaces and walking surfaces.
 - d. Clearance: Clearance between handrail gripping surface and adjacent surfaces shall be 1-1/2 inches minimum.
 - e. Gripping Surface: Gripping surfaces shall be continuous, without interruption by newel posts, other construction elements, or obstructions.

- f. Circular Cross Section: Handrails with a circular cross section shall have an outside diameter of 1-1/4 inches minimum and 2 inches maximum. See drawings and below for specific project requirements.
 - g. Surfaces: Handrails, and any wall or other surfaces adjacent to them, shall be free of any sharp or abrasive elements. Edges shall be rounded.
 - h. Fittings: Handrails shall not rotate within their fittings.
 - i. Handrail Extensions: Handrails shall extend beyond and in the same direction of stair flights and ramp runs; with the exception of continuous handrails at the inside turn of stairs and ramps. Handrails shall extend horizontally above the landing 12 inches minimum beyond the top and bottom of ramp or stair runs. Extensions shall return to a wall, guard, or floor, or shall be continuous to the handrail of an adjacent ramp run.
 - 2. ADA-AG - American Disabilities Act Accessibility Guidelines
 - B. Source Limitations: Obtain each type of railing through one source from a single manufacturer.
 - C. Qualifications
 - 1. Fabricator: Company specializing in performing the work of this Section with minimum 5 years documented experience
 - 2. Erector: Company specializing in performing the work of this Section with minimum 5 years documented experience
 - D. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings
 - E. Perform work in accordance with AISC-Specification for Architecturally Exposed Structural Steel (AESS) where finished work will be exposed to view.
 - F. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel."
 - G. Acceptance: Metal fabrications exposed to view shall be of the highest quality and in accordance with applicable portions of AISC (American Institute of Steel Construction) - Specification for Architecturally Exposed Structural Steel (AESS). Quality of appearance shall be grounds for acceptance or rejection of the work of this section, decisions regarding appearance quality shall be at the sole discretion of the architect / engineer. Work that is rejected on the grounds of appearance shall be repaired or replaced with no additional cost to Owner.
 - H. Mock-up:
 - 1. Erect sample mock-up installation for each fabrication type to be installed on the project to include supports, rails, panels, characteristic patterns, and accessories. Provide the following: Hand rail and guard rail assemblies as indicated in the drawings.
 - 2. Do not proceed with purchase, fabrication or installation of multiple items until mock-up has been accepted.
 - 3. Locate where directed. Coordinate as necessary
 - 4. When accepted, mock-up will demonstrate minimum standard for the Work. Mock-up may remain as part of the Work
- 1.5 PROJECT CONDITIONS
- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.
- 1.6 COORDINATION AND SCHEDULING
- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
- C. Steel and Iron:
 - 1. Tubing: ASTM A 500 (cold formed).
 - 2. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 3. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.2 MANUFACTURERS

- A. Guard railings and hand railings: custom metal fabrication shop with demonstrated experience in similar type and scope of work.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners: Provide concealed fasteners, unless unavoidable or standard for railings indicated.
 - 1. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
 - 2. Stainless-Steel Railings: Type 304 stainless-steel fasteners
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
 - 2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post Installed Anchors: Unless specified otherwise, provide cast-in-place, chemical, or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488.
- E. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- F. Shop Primers: Provide primers that comply with Division 9 painting Sections.
- G. Grout and Anchoring Cement: Factory-packaged, nonshrink, nonmetallic grout complying with ASTM C 1107; or water-resistant, nonshrink anchoring cement; recommended by manufacturer for exterior use.
- H. Closure Chain: heavy duty link chain to close off loading dock edge, reference drawings.

2.4 FABRICATION - GENERAL

- A. General: Fabricate railings to comply with design, dimensions, and details indicated, but not less than required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces
- C. Form work true to line and level with accurate angles and surfaces.
- D. Form changes in direction by bending or by inserting prefabricated elbow fittings.

- E. Form curves and bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- F. Close exposed ends of railing members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, end caps and anchors to interconnect railing members to other work, unless otherwise indicated.
- I. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- J. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- K. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- L. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.5 FABRICATION – GUARDRAILS AND HAND RAILS

- A. Provide steel pipe handrails at walls, ramps and stairs with radius corners. Railing components, handrails at walls: 1-1/2 inch diameter nominal pipe, Schedule 40 minimum.
- B. Provide handrails designed to support minimum live loads required by applicable codes and the OSHA requirement of at least 200 pounds applied in any direction at any point.
- C. Butt railing splices and reinforce by a tight fitting interior sleeve not less than 6 inches long. Weld and grind smooth all joints.
- D. Bend railings at corners, uniformly form in jigs, with cylindrical cross-section of pipe maintained through the entire bend.
- E. Secure handrails to walls by means of 1/2 inch diameter solid bar wall brackets through hole in bottom of rail and plug welded to top of rail.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Iron:
 - 1. Shop-Primed Galvanized Railings:
 - a. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.
 - b. Comply with ASTM A 123/A 123M for hot-dip galvanized railings
 - c. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion

- d. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth
- e. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components
- f. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner
- g. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning
- h. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.
- B. Fit exposed connections together to form tight, hairline joints.

3.2 INSTALLATION

- A. For manufactured railing systems install according to the manufacturers requirements and recommendations.
- B. General: Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation.
 - 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Anchor posts in concrete by manufacturer's standard steel flange with insert or by inserting into preset steel pipe sleeves, formed or core-drilled holes, or as shown and grouting annular space.
- D. Cover anchorage joint with flange of same metal as post and/or railings
- E. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.
- F. Continuous weld end cap with full coverage at each end of open rail. Grind smooth and remove all abrasive material.
- G. Attach handrails to wall with wall brackets.
 - 1. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs.

3.3 ADJUSTING and CLEANING

- A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
- C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness
- D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.4 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 52 00

DIVISION 06 – WOOD, PLASTICS & COMPOSITES

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SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Framing with treated and untreated dimensional lumber.
 - 2. Rooftop equipment bases and support curbs.
 - 3. Wood blocking, backing, furring, nailers and grounds in equipment bases, walls and ceiling for support of all wall and/or ceiling mounted equipment, fixtures, railings, grab bars, doorstops and miscellaneous surface mounted items.
 - 4. Plywood backing panels.
 - 5. Fire Treated and Preservative treatment of wood
 - 6. Pre-fabricated connectors

1.2 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPAA: Western Wood Products Association.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.
- C. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- D. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Wood-preservative-treated wood.
 - 2. Fire-retardant-treated wood.
 - 3. Engineered wood products.
 - 4. Power-driven fasteners.

5. Powder-actuated fasteners.
 6. Expansion anchors.
 7. Metal framing anchors.
- 1.4 QUALITY ASSURANCE
- A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

- 2.1 WOOD PRODUCTS, GENERAL
- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 4. Provide dressed lumber, S4S, unless otherwise indicated.
 5. Lumber products included in the finished project, shall comply with the VOC requirements stated in section 01 81 14.
 - B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- 2.2 WOOD-PRESERVATIVE-TREATED LUMBER
- A. Preservative Treatment by Pressure Process: AWPAC2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPAC31 with inorganic boron (SBX).
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
 - B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
 - C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
 - D. Application: Treat items indicated on Drawings, and the following:
 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.

5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).
 1. Use Exterior type for exterior locations and where indicated.
 2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
 3. Use Interior Type A, unless otherwise indicated.
- B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- C. For exposed items indicated to receive a finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- D. Application: Treat items indicated on Drawings.

2.4 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent
- B. Interior framing: see structural drawings.
 1. Hem-fir (north); NLGA.
 2. Spruce-pine-fir; NLGA.
 3. Hem-fir; WCLIB, or WWP.
 4. Northern species; NLGA.
 5. Western woods; WCLIB or WWP.
- C. Joists, Rafters, and Other Framing Not Listed Above: see structural drawings:
 1. Hem-fir (north); NLGA.
 2. Douglas fir-larch; WCLIB or WWP.
 3. Spruce-pine-fir; NLGA.
 4. Hem-fir; WCLIB or WWP.
 5. Douglas fir-larch (north); NLGA.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
- B. For items of dimension lumber size, see structural drawings.
 1. Hem-fir (north); NLGA.
 2. Spruce-pine-fir; NLGA.
 3. Hem-fir; WCLIB, or WWP.
 4. Western woods; WCLIB or WWP.
 5. Northern species; NLGA.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.
- B. Wall backing for future wall mounted installations: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, 3/8-inch nominal thickness.
- C. Plywood and sheathing products included in the finished project, shall comply with the VOC requirements stated in section 01 81 14

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.8 METAL FRAMING ANCHORS

- A. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 - 1. Use for interior locations where stainless steel is not indicated.
- B. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.
- C. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
- D. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
 - 1. Width: 3/4 inch.
 - 2. Thickness: [0.050 inch
 - 3. Length: 16 inches.
- E. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.

2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
 - 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- D. Do not splice members between supports, unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c
 - 2. Coordinate installation of Concealed Backing, Flooring, Grounds and Cants with other work.
- F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- K. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with approved fastener patterns where applicable
 - 2. Use finishing nails, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Provide solid wood blocking, backing, furring, nailers and grounds in equipment bases, walls and ceiling for support of all wall and/or ceiling mounted equipment, fixtures, railings, grab bars, doorstops and miscellaneous surface mounted items.
- B. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- C. Provide solid fire treated wood blocking or sheathing backing for all wall mounted equipment, chalkboards, tackboards, shelf standards, wall cabinets, mirrors, toilet accessories, partitions, panels shelving, casework, fixtures, door stops, etc.
- D. At existing framed wall and ceiling construction, install solid fire treated wood blocking for all equipment, chalkboards, tackboards, shelf standards, wall cabinets, mirrors, toilet accessories, partitions, panels shelving, casework, fixtures, door stops, etc. Remove existing finishes as necessary to install solid blocking and/or backing. Patch back finishes to match existing adjacent surfaces.
- E. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- F. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00

SECTION 06 16 43 – SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Floor, Wall, Roof, and Parapet sheathing.
 - 2. Wall equipment support sheathing.
 - 3. Fascia and miscellaneous framing sheathing.

1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
- B. Evaluation Reports: For following products, from ICC-ES:
 - 1. Fire-retardant-treated plywood.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.2 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Certified Wood: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- C. Plywood: DOC PS 1.
- D. Oriented Strand Board: DOC PS 2.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings.

2.4 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing per structural drawings.

2.5 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing per structural drawings.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall and Roof Sheathing:
 - a. Screw to cold-formed metal framing.
 - b. Space panels **1/8 inch** apart at edges and ends.

END OF SECTION 06 16 43

SECTION 06 17 33 - WOOD I-JOISTS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Wood chord and plywood web joists for roof and floor framing.
 - 2. Bridging and bracing.
 - 3. Framing for openings.
- B. Related Sections
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 061000 – Rough Carpentry

1.2 REFERENCES

- A. Comply with all References in effect, most active, or latest version as of the date of the Contract Documents.
- B. ASTM International (ASTM)
 - 1. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. Engineered Wood Association (APA) PRP-108 - Performance Standards and Qualification Policy for Structural-Use Panels.
- D. Forest Stewardship Council (FSC) STD-40-004 - Chain of Custody Standard.
- E. National Institute of Standards and Technology (NIST) - Product Standard PS 20 - American Softwood Lumber Standard.
- F. 2015 International Building Code (2015 IBC)

1.3 SUBMITTALS

- A. Submittals for Review
 - 1. Shop Drawings: Indicate framing system, sizes and spacing of joists, loads, bearing and anchorage details, bridging and bracing, and framed openings.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Minimum five (5) years documented experience in work of this Section.
- B. Identify lumber and panel products by official grade mark.
- C. Design Requirements: Design joists under supervision of Professional Structural Engineer with experience in work of this Section, licensed in the State of Idaho.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Transport and store joists in upright position resting on bearing ends.
- B. Protect from moisture, warpage, and distortion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Design Basis: Contract Documents are based on products by RedBuilt Company (www.redbuilt.com).
- B. Equivalent products by following manufacturers are acceptable:

1. Trus Joist (www.woodbywy.com)
 2. Boise Cascade (www.bc.com)
 3. Southern Components, Inc. (www.socomp.com)
 4. Western Wood Structures, Inc. (www.westernwoodstructures.com)
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Lumber
1. Graded in accordance with NIST PS 20.
- B. Oriented Strand Board
1. APA PRP-108, grade as dictated by design, exposure as indicated on drawings.

2.3 ACCESSORIES

- A. Fasteners: Galvanized steel, type suited to conditions.
- B. Joist Bridging: Type and size required by joist Manufacturer.

2.4 FABRICATION

- A. Cut members accurately to length to achieve tight fit.
- B. Provide single top and bottom chords.
- C. Jig joists during fabrication to obtain tight joint connections.

PART 3– EXECUTION

3.1 INSTALLATION

- A. Install joists in accordance with manufacturer's instructions.
- B. Place level and true to line.
- C. Provide temporary bracing to hold joists in position until permanently secured.
- D. Prior to inducing loads, place permanent bridging, bracing, and anchors to maintain joists straight and in correct position.
- E. Do not field cut joists.
- F. Place headers and supports to frame openings as specified in Section 061000.
- G. Installation Tolerances: Maximum 1/4 inch variation from true position.

END OF SECTION 06 17 33

SECTION 06 17 53 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Shop fabricated wood trusses for roof framing.
 - 2. Bridging, bracing, and anchorage.
- B. System Description
 - 1. Design loads per structural calculations.
- C. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 061000 – Rough Carpentry.

1.2 REFERENCES

- A. Comply with all References in effect, most active, or latest version as of the date of the Contract Documents.
- B. ASTM International (ASTM) (www.astm.org):
 - 1. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. Engineered Wood Association (APA) (www.apawood.org) PRP-108 - Performance Standards and Qualification Policy for Structural-Use Panels.
- D. Forest Stewardship Council (FSC) (www.fscus.org) STD-40-004 - Chain of Custody Standard.
- E. National Institute of Standards and Technology (NIST) (www.nist.gov) - Product Standard PS 20 - American Softwood Lumber Standard.
- F. Truss Plate Institute (TPI) (www.tpinst.org) - Design Specifications for Metal Plate Connected Wood Trusses:
 - 1. BWT-76 - Bracing Wood Trusses.
 - 2. HET-80 - Handling and Erecting Wood Trusses.
 - 3. PCT-80 - Metal Plate Connected Parallel Chord Wood Trusses.
 - 4. TPI-85 - Metal Plate Connected Wood Trusses.
 - 5. QST-88 - Metal Plate Connected Wood Trusses.
- G. American Lumber Standards Committee: Softwood Lumber Standards. (ALSC).
- H. National Forest Products Association. (NFPA).
- I. Southern Pine Inspection Bureau. (SPIB).
- J. West Coast Lumber Inspection Bureau. (WCLIB).
- K. Western Wood Products Association. (WWPA).
- L. Underwriters Laboratory (UL) - Fire Resistance Directory.
- M. 2012 International Building Code. (2012 IBC).

1.3 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate sizes and spacing of trusses, loads and truss cambers, framed openings and bracing. Submit design calculations. Shop drawings and design calculations shall bear signed seal of a Professional Engineer licensed in the State of Idaho.
- C. Product Data: Provide truss configurations, bearing and anchor details, bridging and bracing and blocking.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by ALSC.
 - 2. Plywood Grading Agency: Certified by APA.
- B. Truss Design, Fabrication and Installation: In accordance with Truss Plate Institute BWT-76, HET-80, PCT-80 including supplement, TPI-85 including supplement, QST-88.
- C. Maintain one copy of each document on site.
- D. Qualifications
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.
 - 2. Design trusses under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State of Idaho.
- E. Regulatory Requirements
 - 1. Conform to applicable code for loads, seismic zoning, and other governing load criteria.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Division 01.
- B. Handle and erect trusses in accordance with TPI HET-80.
- C. Store trusses in vertical position resting on bearing ends.

1.6 PROJECT/SITE CONDITIONS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber Grading Rules: WWPA.
- B. Wood Members: Single top and bottom chord, Douglas Fir species, 19 percent minimum moisture content. Finger scarfing permitted.
- C. Steel Connectors: ASTM A653 steel, Grade B, hot dip galvanized; die stamped with integral teeth.
- D. Truss Bridging: Type, size and spacing recommended by truss Manufacturer.

2.2 ACCESSORIES

- A. Wood Blocking and Framing for Openings: In accordance with Section 061000- Rough carpentry softwood lumber, S/P/F species, construction grade, 19 percent maximum percent minimum moisture content.
- B. Fasteners: Hot dip galvanized (unfinished) steel, type to suit application.
- C. Bearing Plates: Hot dip galvanized.
- D. Pre-manufactured Blocking Panels: As required.

2.3 FABRICATION

- A. Fabricate trusses to achieve structural requirements specified.
- B. Brace wood trusses in accordance with TPI BWT-76.

2.4 SOURCE QUALITY CONTROL – NOT USED.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that supports and openings are ready to receive trusses.

3.2 PREPARATION

- A. Coordinate placement of support items.

3.3 EXECUTION

- A. Install trusses in accordance with Manufacturer's instructions.
- B. Set members level and plumb, in correct position.
- C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure plumb, and in true alignment until completion of erection and installation of permanent bracing.
- D. Do not field cut or alter structural members without approval of Architect/Engineer.
- E. Place headers and supports to frame openings required.
- F. Frame openings between trusses with lumber in accordance with Section 061000.
- G. Coordinate placement of decking with work of this Section.
- H. Install blocking panels per manufacturer's recommendations.
- I. Tolerances:
 - 1. Framing Members: 1/4 inch maximum from true position.

END OF SECTION 06 17 53

SECTION 06 18 00 - GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Glue laminated wood beams, architectural appearance grade with exterior rated glues and finishes.
 - 2. Steel hardware and attachment brackets.
- B. Related Sections
 - 1. Division 05 Section "Structural Steel" and "Metal Fabrications" for steel support, fasteners and bracket coordination.
 - 2. Division 06 Section "Interior Finish Carpentry" for surface preparation, painting and sealing.
 - 3. Division 09 Section "Painting" for surface preparation, painting and sealing.

1.2 REFERENCES

- A. AITC - American Institute of Timber Construction.
- B. ANSI A190.1 - Structural Glued Laminated Timber.
- C. ASTM A 36 - Specification for Structural Steel.
- D. ASTM D 2559 - Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.
- E. ASTM A 307 - Specification for carbon steel, bolts, and studs 60,000 psi minimum tensile strength.

1.3 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Indicate sizes and spacing of members, cambers, bearing and anchor details.

1.4 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturer: Company specializing in manufacture of glue laminated structural units with three years minimum experience, and certified by the AITC in accordance with ANSI A190.1.
 - 2. Erector: Company specializing in erection of glue laminated structural units with five years experience.
- B. Regulatory Requirements
 - 1. Conform to I.B.C. for loads, seismic zoning, and other load criteria.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store and protect products under provisions of Division 01.
- C. Protect members in accordance with AITC requirements for individually wrapped material.
- D. Leave individual wrapping in place until finishing occurs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - not used.

2.2 MATERIALS

- A. Lumber: Douglas Fir lumber conforming to grading rules and the following values:
 - 1. Bending (Fb):
 - a. GluLam Beams Fb+: 2400 psi.
 - b. GluLam Beams Fb-: 2400 psi
 - 2. Tension Parallel to Grain (Ft):
 - a. GluLam Beams Ft: 1150 psi.

- 3. Compression Parallel to Grain (F_c):
 - a. GluLam Beams F_c : 1650 psi.
 - 4. Compression Perpendicular to Grain Bottom (F_{cl}):
 - a. GluLam Beams F_{cl} : 740 psi.
 - 5. Compression Perpendicular to Grain Top (F_{cl}):
 - a. GluLam Beams F_{cl} : 740 psi.
 - 6. Horizontal Shear (F_v):
 - a. GluLam Beams F_v : 300 psi.
 - 7. Modulus of Elasticity (E):
 - a. GluLam Beams E : 1.8×10^6 psi.
 - B. Adhesive: ASTM D 2559 - For wet condition of service.
 - C. Sealer - Penetrating surface sealer suitable for site finish per division 09.
 - D. Grade: architectural appearance grade with exterior rated glues and finishes
- 2.3 ACCESSORIES
- A. Steel Connections and Brackets: ASTM A 36 - Weldable quality, shop primed painted.
 - B. Thru-Bolts: ASTM A-307 Steel
 - C. Hardware: ASTM A 325 - Structural quality steel; shop primed painted.
 - D. Anchor Bolts: ASTM A 307 Steel.
 - E. Bearing Plate Anchors: As Indicated on Drawings.
 - F. Protective Paper Wrap: 30 lb. Asphalt - impregnated building paper.
 - G. Sheet Metal End Cap: Kynar Finish at all end grain exposed locations.
- 2.4 FABRICATION
- A. Fabricate glue laminated structural members in accordance with AITC architectural grade.
 - 1. Provide architectural grade for exposed locations (exterior and interior).
 - 2. Provide structural grade for concealed locations.
 - B. Verify dimensions and site conditions prior to fabrication.
 - C. Cut and fit component parts accurately to length to achieve tight joint fit.
 - D. Fabricate member with camber only where specified by Structural Engineer.
 - E. Do not splice or join members in locations other than that indicated, without permission.
 - F. Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.
 - G. After end trimming, seal with penetrating sealer in accordance with AITC requirements.

PART 3 - EXECUTION

- 3.1 EXAMINATION
- A. Verify that supports are ready to receive trusses.
 - B. Verify sufficient end bearing area.
 - C. Beginning of installation means acceptance of existing conditions.
- 3.2 PREPARATION
- A. Coordinate placement of bearing and support items.
- 3.3 ERECTION
- A. Set structural members level and plumb, in correct positions.
 - B. Provide temporary bracing and anchorage to hold members in place until permanently secured.
 - C. Fit members together accurately without trimming, cutting, or any other unauthorized modification.
 - D. Install building paper wrap between ledgers and concrete or masonry walls.
 - E. Tolerances
 - 1. Framing Members: 1/2 inch maximum from true position.
 - F. Apply finish to glulam member (exterior and interior) per Division 06 and 09 specifications.

END OF SECTION 06 18 00

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Plastic-laminate cabinets.
 - 2. Plastic-laminate countertops
 - 3. Casework accessories, and cabinet hardware.
 - 4. Closet and utility shelving.
 - 5. Pre-fabricated metal utility storage shelving units and shelf rails.
 - 6. Preparation for installing utilities.
 - 7. Shop finishing of interior woodwork.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - 2. Division 06 Section "Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.
 - 3. Division 09 Section "Vinyl Wall Coverings" for millwork coordination in areas where vinyl wall covering shall be installed prior to millwork installation.
 - 4. Division 22 Section "Plumbing" for rough-in and coordination of sinks, service fixtures and fittings, supply and waste lines, connections and vents incorporated into casework.
 - 5. Division 23 Section "HVAC" for coordination of ductwork and vents incorporated into casework.
 - 6. Division 26 Section "Electrical" for rough-in and coordination of electrical, phone, data outlets, J-boxes, conduit, fittings and cabinet lighting and controls incorporated into casework.

1.2 REFERENCES

- A. ANSI A135.4 – Basic Hardboard
- B. ANSI A208.1 – Mat Formed Wood Particle Board
- C. ANSI A208.2 – Medium Density Fiberboard
- D. BHMA A156.9 – Cabinet Hardware
- E. AWI (Architectural Woodwork Institute) – Quality Standards
- F. NEMA (National Electric Manufacturers Association) LD3 – High Pressure Decorative Laminates
- G. PS 20 – American Softwood Lumber Standard
- H. PS 1 – Construction and Industrial Plywood
- I. ALA – American Laminators Association
- J. NHLA – National Hardwood Lumber Association
- K. AHA – American Hardboard Association
- L. HPVA – Hardwood Plywood & Veneer Association
- M. ASTM – American Society for Testing and Materials
- N. LMA – Laminated Materials Association
- O. ASTM G-22 – Compliance for product 390 (60 finish)

1.3 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.
- B. EXPOSED PORTIONS
 - 1. All surfaces visible when doors and drawers are closed.

2. Cabinet tops 80" and under above finish floor or over 80" above finish floor if visible from an upper building level.
 3. Visible edges of cabinet ends, doors and drawer fronts.
 4. Sloping tops of cabinets that are visible.
 - C. SEMI-EXPOSED PORTIONS
 1. All surfaces visible when doors and drawers are open including interior faces of hinged doors to include back panel of sink cabinets.
 2. The underside bottoms of wall hung cabinets.
 3. Visible surfaces in open cabinets or behind glass doors.
 4. Visible portions of bottoms, tops and ends in front of sliding doors in closed position.
 - D. CONCEALED PORTIONS
 1. Toe space unless otherwise specified.
 2. Sleepers.
 3. Web frames, stretchers.
 4. Security panels.
 5. Underside of bottoms of cabinets less than 30" above the finished floor.
 6. Flat tops of cabinets above 80" or more from the finished floor, except if visible from an upper building level.
 7. The three non-visible edges of adjustable shelves.
 8. The underside of countertops, knee spaces and drawer aprons.
 9. The faces of cabinet ends of adjoining units that butt together.
- 1.4 SUBMITTALS
- A. Product Data: For Panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, solid-surfacing material, cabinet hardware and accessories and finishing materials and processes.
 - B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 1. Show details full size.
 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, electrical devices and other items installed in architectural woodwork.
 4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf. (Required where hardwood veneer panel products are indicated).
 - C. Samples for Initial Selection:
 1. Shop-applied transparent finishes.
 2. Shop-applied opaque finishes.
 3. Plastic laminates.
 4. PVC edge material.
 5. Thermoset decorative panels.
 - D. Samples for Verification:
 1. Lumber and moldings with or for transparent finish, not less than 50 sq. in., 5 inches wide by 24 inches, for each species and cut, finished on 1 side and 1 edge.
 2. Veneer-faced panel products with or for transparent finish, 8" 10" for each species and cut. Include at least one face-veneer seam and finish as specified.
 3. Lumber, moldings and panel products for opaque finish, 50 sq. in. for lumber and 8 by 10 inches for panels, for each finish system and color, with 1/2 of exposed surface finished.
 4. Plastic laminates, 8" x 10" for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
 5. Thermoset decorative-panels, 8" x 10", for each type, color, pattern, and surface finish, with edge banding on 1 edge.
 6. Solid-surfacing materials, 6" square.
 7. Exposed cabinet hardware and accessories, one unit for each type and finish.
 - E. Qualification Data: For Installer and fabricator.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance for a minimum of 5 years.
- B. Installer Qualifications: Fabricator of products.
- C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork
- D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. Perform work in accordance with **AWI Custom Grade** standards, as a minimum requirement
 - 2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.
 - 3. Stainless Steel Counter Top Industry Standards: All materials entering into the Work of this Section shall conform with the "National Sanitation Foundation Standards", established by the National Sanitation Foundation, Ann Arbor, Michigan.
 - 4. Stainless Steel Counter Top SMACNA (Sheet Metal and Air Conditioning Contractor's National Association) Kitchen Equipment Fabrication Guidelines.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Provide mockup of full size base cabinet and upper cabinet, provide units with specified countertop; with hardware installed
 - 2. Units will be examined to ascertain quality and conformity to AWI quality level standards and specification requirements
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Coordination and Meetings", one month prior to installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.
- B. Due to the accelerated time constraints of the phasing of the project, the contractor shall provide adequate off site storage within 10 miles of the project site for storage and stocking of the casework. Such storage shall be available to the Owner and Architect to review stored material.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.
- C. Coordinate the work with plumbing and electrical rough-in and wall finish.

1.9 WARRANTY

- A. Provide two year defect-free specialty warranty. Warranty period commences on the date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Basis of Design: Pacific Cabinets – Institutional Laminate series
- B. Custom Woodcraft Cabinets, equivalent to basis of design
- C. Select Euro Systems, equivalent to basis of design
- D. Simonet, equivalent to basis of design
- E. Beck, equivalent to basis of design
- F. Substitutions under the provision of Division 01.

2.2 MATERIALS:

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork, casework and quality grade specified, unless otherwise indicated.
- B. Wood Species and Cut for Transparent Finish: White Birch, plain sawn or sliced.
- C. Wood Species for Opaque Finish: Poplar
- D. Wood Products: Comply with the following:
 1. Hardboard: AHA A135.4.
 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with low urea formaldehyde formulations. 3/4" panel thickness, unless otherwise indicated.
 3. Particleboard: ANSI A208.1, Grade M-2, 45lb density, industrial grade pine-based particle board, 3/4" panel thickness unless otherwise indicated (42lb density and/or fir based particle board products are not acceptable).
 4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
 5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing low urea formaldehyde resins.
- E. Thermoset Decorative Panels:
 1. Particleboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1. Provide in panel thicknesses indicated.
 2. Medium density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1 for all drawer fronts, doors and shelving. Provide in panel thicknesses indicated
 3. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semi exposed edges. Match panel color unless otherwise indicated.
 4. Up to two colors of thermoset decorative overlay panels may be selected by Architect from manufacturer's standard and premium colors.

- F. Standard Casework, not specified elsewhere: High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
 - a. Formica Corporation.
 - b. Nevamar Company, LLC; Decorative Products Div.
 - c. Wilsonart International; Div. of Premark International, Inc.
 - d. Pionite Corporation
 - 2. High-Pressure Decorative Laminate (HPDL), NEMA LD 3, Grade Standards:
 - a. Horizontal Grade .050" = GP50
 - b. Postforming Grade .042" = PF42
 - c. Cabinet Liner Grade .020" = CL20
 - d. Chemical Resistant Grade .36" = CR36
- G. Tempered Float Glass for Cabinet Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3, with exposed edges seamed before tempering, 6 mm thick, unless otherwise indicated.
- H. PVC edge trim molding: Provide PVC edge trim molding to match selected plastic laminate colors and MDL/thermoset decorative overlay panel colors. Where wood grain laminate is selected, matching wood grain PVC edge trim is required.
 - 1. Edge trim thickness:
 - a. Door and drawer edging – 3mm
 - b. Body front edging – 3mm
 - c. Cabinet shelf edges – 3mm
 - d. All other misc. shelf edges – 3mm
- I. Finishes: Reference Finish Schedule, Finish Material Legend for manufacturer, product and color selections.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
 - 1. Reference Standards: Hardware, BHMA A156.9 "American National Standards for Cabinet Hardware"
 - 2. Manufacturers: Subject to compliance with requirements and specific manufacturers product and model no. references, provide products by the following manufacturers:
 - a. Blum, Hafele, Grass, Stanley, Knappe and Vogt, Doug Mockett & Co., CompX National and equivalent products from the other manufacturers, subject to review and approval by Architect.
 - 3. Hardware Finishes: Exposed hardware finishes: Brushed Chrome BHMA 626 finish or 630. For concealed hardware, provide manufacturers standard finish.
- B. Butt Hinges: Five knuckle, epoxy powder coated, institutional grade, 2-3/4" overlay type with hospital tip. 0.095" thick. ANSI-BIFMA standard A156.9, Grade 1, 270 degree opening standard. Brushed chrome finish or BHMA 626 finish.
 - 1. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
 - 2. Doors 36" high and under shall have two (2) hinges per door. Doors over 37" and under 60" high shall have three (3) hinges per door. Doors over 60" high shall have four (4) per door.
- C. Wire Pulls: Back mounted, solid metal, 4" long, 5/16" in diameter for doors and drawers. 'U' shaped pulls, satin chrome, BHMA 630 or BHMA 626 finish.
- D. Catches: Magnetic catches, BHMA A156.9, B03141 and/or push-in magnetic catches.
- E. Lock hasps: Pad lock loop fabricated from 0.090-inch nominal-thickness stainless steel metal.
- F. Catches: Magnetic catches, BHMA A156.9, B03141 and/or push-in magnetic catches. Magnetic door catch with maximum 5 to 7 pound, heavy duty, pull provided, attached with screws and slotted for adjustment.

- G. Adjustable Shelf Support System: Standard adjustable shelf support system shall be provided by inserting polycarbonate double-pin locking shelf clips into predrilled 5mm diameter holes 32mm (1-1/4") on centers. Color Clear. Shelves may be fixed using a retaining screw.
- H. Upswing cabinet/shelf unit door: Blum 270E series Retractable casework door hardware set, sized to accommodate horizontal flipper doors indicated in the drawings, including but not limited to guide roller, carriage plate, hinges mounting plates, flipper door rollers, and related anchors.
- I. Drawer Slides: BHMA A156.9, B05091: Side or bottom mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091 and rated for the following loads:
 - 1. Box Drawer Slides: 100 lbf (440N)
 - 2. File Drawer Slides : 200 lbf (890N)
 - 3. Pencil Drawer Slides: 45 lbf (200N)
 - 4. Keyboard Slide: 75 lbf (330N)
 - 5. Trash Bin Slides: 200 lb (890N)
- J. Chain Bolt: Where indicated, "Stanley" model CD1055 or equivalent.
- K. Locks: Verify all keying with owner prior to fabrication. Key using a single master for the entire project. One lock per panel door or drawer where indicated and all locks in each individual room shall be keyed alike. Each room shall be keyed differently from all other rooms in the building. Provide 3 keys per room, properly tagged and identified upon delivery. Where noted on the drawing, key lock individually (personal storage area) and provide 3 keys.
 - 1. Doors – Olympus Lock, 100DR Deadbolt, N Series: National Keyway
 - 2. Drawers – Olympus Locks, 200DW Deadbolt, N Series: National Keyway
 - 3. Master Keying – National D4291 Cylinder with 5-pin keying, coordinate with owner for keying and master keying. Provide 3 master keys in addition to individual keys.
- L. Door/drawer silencers: minimum of 2 per door and drawer, with 4 on doors larger than 36" high.
- M. Closet Hanger Bar and Supports: Telescoping steel or brass tubing, with forged end brackets; size and wall-thickness to support hanging of clothing full length.
- N. Grommets for Cable Passage through Countertops: 3-1/8" OD, molded-plastic grommets with lid flap for wire passage. Spring clip, lever hinge style grommet.
 - 1. Metallic silver or charcoal grey as selected by Architect.
 - 2. Product: Subject to compliance with requirements, provide OG series Pass Through Grommet by Doug Mockett & Company, Inc. 3-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 3. Provide (2) round penetrations with PVC grommet at all counter tops with open knee space shown below, work stations (computer) and desk countertops. Coordinate locations with Architect.
 - 4. Show proposed locations in shop drawings to be verified by Architect. Provide **(10)** grommets as minimum quantity allowance.
- O. Drawer Accessories:
 - 1. Standard lateral hanging files – 1" x 1/8" zinc plated steel flat bars adjustable for both letter and legal size files.
 - 2. Provide for all indicated file drawers based on cabinet type.
- P. Robe Hook:
 - 1. Basis-of-Design Product: Ives 582,
 - a. Provide two on inside of each locker type casework compartment.
- Q. Support Brackets:
 - 1. Countertop support and brackets equal to Hafele Hebgo Bracket, 287.44.461, with 330 lb per pair load capacity.
 - 2. Provide and locate where indicated on drawings for open countertop support at work station and knee space open countertop spans. Support brackets shall occur at 36" o.c. maximum spacing.
- R. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 - 2. Satin Stainless Steel: BHMA 630.

- S. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS – Custom grade is standard spec unless specified different in plans.

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content. Steel studs, straps and accessories as detailed. Bolts, nuts, washers, lags, pins and screws of size and type to suit application and in compliance for type permitted by **AWI Standards – Custom Grade** for concealed and semi-exposed portions of architectural woodwork and cabinets/casework. No exposed fasteners or trim cap covered fasteners permitted on exposed casework surfaces. Concealed joint fasteners: in compliance with **AWI Standards**, table 400B-T-10 "Joinery of Case Body Members" for **Custom Grade**. Provide dowels, splines, biscuits or dado joinery. European assembly screws may be used to join panels from the outside on concealed side or back panel faces only (fasteners and/or plastic trim caps not visible on exposed surfaces). Trim caps permitted on semi-exposed surfaces for attachment to walls only. Anchors for securing casework to walls and support framing: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors. Adhesives, General: Do not use adhesives that contain urea formaldehyde. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24): Wood Glues: 30 g/L.
 - 2. Contact Adhesive: 250 g/L.
- G. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement, contact cement or PVA. Adhesive for Bonding Edges: Hot-melt adhesive.

2.5 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-Grade interior woodwork complying with referenced quality standard (AWI).
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fabricate finished hardwood for transparent finish to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
 - 2. Edges of Rails and Similar Members More Than 3/4" Thick: 1/8".
- D. Complete fabrication, including assembly, finishing and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a clear sealer.
- F. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

- G. Pocket screws will only be allowed in concealed areas.

2.6 PLASTIC-LAMINATE CABINETS

- A. Grade: Custom.
- B. AWI Type of Cabinet Construction: Flush overlay on type 'A' frameless construction
- C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: Grade GP50
 - 2. Postformed Surfaces: Grade PF42
 - 3. Vertical Surfaces: Grade VG28
 - 4. Edges: PVC edge banding 3mm thick, matching laminate in color, pattern and finish.
 - 5. Exposed material shall be pattern(s) and color(s) as specified or selected. For exposed vertical surfaces of cabinet and both faces of drawer and door panels laminated with adhesive and pressure bonded to 3/4" minimum furniture grade MDF core stock
- D. Materials for Semiexposed Surfaces:
 - 1. Thermoset Decorative Panels: ALA, polyester or melamine resin impregnated web, pressure bonded and thermally fused to a core of 45 lb industrial grade pine particle board or furniture grade MDF core stock panels in thicknesses indicated. All interior semiexposed surfaces included: Drawer Construction; Gables and Backs, Shelving. Unless Noted Otherwise, the interiors and the shelves in the open shelving units shall be thermoset decorative panels. Adjustable shelves shall have the same lamination on both faces.
 - a. Edges of shelves and divider panels: PVC edge banding 3mm thick, matching laminate in color, pattern and finish.
 - b. All shelving shall be MDF.
- E. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect from laminate manufacturer's full range in the following categories:
 - a. Solid colors, matte finish.
 - b. Wood grains, matte finish
 - c. Patterns, matte finish.
 - 2. Up to five (5) colors of plastic laminate for cabinets may be selected by Architect from manufacturer's standard and premium colors. Wood grains and patterned laminate may be selected.
 - 3. Up to two (2) colors of thermoset decorative panel laminate may be selected by architect from manufacturer's available colors.

2.7 FABRICATION OF PLASTIC LAMINATE CASEWORK

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. Fit shelves, doors, drawer fronts and exposed edges with edge trim. Use one piece for full length only.
- C. Cap exposed plastic laminate finish edges with Edge Trim. Use one piece of full length.
- D. Coordinate millwork fabrication with return air grille and metal ductwork shown in the plans—concealed by casework. Reference mechanical drawings and specification section Division 23.
- E. Drawers as follows:
 - 1. Drawer fronts: Minimum 3/4" thick; overlay style except match door thickness.
 - 2. Drawer Sides and Back: Minimum 1/2" thick thermoset decorative panel with lock shoulder joint and glued.
 - 3. Drawer Bottom: Minimum 1/4" thick thermoset decorative panel dadoed into front and sides and glued.
 - 4. Keyboard trays: Keyboard trays shall be as specified and located as shown on drawings.
 - 5. File Drawers: The width of file drawers and depth of lateral file drawers shall be sized to accommodate legal and letter size folders with the installation of hanging rails. The height and placement of rails shall be sized to accommodate hanging files (11" I.D. Clear)

- F. Doors
 - 1. Doors under 30" wide and/or 80" high: Minimum 3/4" thick particle board panel, identical laminate applied to both faces; overlay style
 - 2. Doors over 30" wide and/or 80" high: Shell be 1-3/8" or 1-3/4" hollow or solid core doors. Identical laminate applied to both faces overlay style.
 - 3. If hinge screws enter only the edge of a door, 3/4" lumber edges shall be glued to the core prior to laminating.
 - 4. Drilling of pilot holes and use of full-threaded screws is required in hanging fiber board and particle board core doors.
- G. Shelves
 - 1. Shelves under 30" wide: Minimum 3/4" thermoset decorative panel with edge trim at exposed edges.
 - 2. Shelves 30" wide to 42" wide: Minimum 1" thermoset decorative panel with edge trim at exposed edges.
 - 3. Shelves wider than 42" shall have intermediate center back edge support with 2" x 3/4" edge trim at front edge. Shelves to be 1" thick.
 - 4. When necessary to cut and fit on site, provide material with ample allowance for cutting. Provide trim for scribing and site cutting.
 - 5. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints tight; secure with concealed fasteners. Locate counter butt joints minimum 2' from sink cut-outs.
 - 6. Provide cutouts for plumbing and light fixtures, inserts, appliances, outlet box, light fixtures and fittings. Verify locations of cutouts from on-site dimensions. Prime paint contact surfaces of cut edges. Field laminate as needed to conceal separations.
 - 7. Unless otherwise noted, all shelves are to be adjustable.
 - 8. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges) are not permitted.
 - 9. Provide recessed toe-kick construction at the front side of all base cabinets. Recess to be 4" high and 2" deep measured in from the finish face of the cabinet. 3/4" thick toe-kick face panel to be shop applied and must recess flush or miter back on exposed finished end panel cabinet configurations.

2.8 PLASTIC-LAMINATE COUNTERTOPS

- A. Grade: Custom
- B. High-Pressure Decorative Laminate Grade: GP50 (General Purpose Grade) Typical. Provide chemical resistant grade CR36 where indicated.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect from manufacturer's full range in the following categories:
 - a. Solid colors, gloss finish.
 - b. Patterns, gloss finish
 - 2. Up to five (5) color/patterns of plastic laminate for countertops may be selected by Architect from manufacturer's full range of available products. Reference finish schedule.
- D. Grain Direction: Parallel to cabinet fronts.
- E. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- F. Core Material: 3/4" 45lb density industrial grade pine particle board or furniture grade medium density fiberboard (MDF) for a total of 1-1/2" countertop.
- G. Core Material at Sinks: Particleboard made with exterior glue or medium density fiberboard made with exterior glue of the type and grade indicated above.
- H. Backer Sheet: Provide continuous full width plastic-laminate backer sheet, Grade BKL, on underside of all countertop substrates. 3/4" thick backer sheet, glued to countertop substrate for balanced 1-1/2" laminated thickness for all countertop construction.
- I. Backsplashes: 3/4" thick and 4" high unless otherwise indicated. Material and color to be same as countertop. Where countertops abut walls or cabinet provide a backsplash to face of countertop.

2.9 STAINLESS STEEL COUNTERTOPS

- A. Grade: Custom.
- B. Welding: Unless otherwise specified herein, all welded corners, joints and connections shall be electrically welded, seamless, with joints invisible. All welds must be thorough, free from pits, cracks, discolorations and other mechanical imperfections, ground smooth and polished to match the rest of the finish. Joints where required by sheet size, shall be butt welded with joint ground smooth, presenting a uniform one-piece construction. Butt joints by spot welding or riveting straps under seams and then filling with solder and then grinding will not be acceptable. All welds shall be passivated to prevent possibility of corrosion. No raw or sharp edges shall be left on any part of work or equipment. Wherever framing is specified to be of galvanized angle or channel construction, the welded joint shall be treated by means of a suitable metallic coating to cover all surfaces marred by welding and grinding operations.
- C. Tops and Shelving: Shall be 14 gauge stainless steel. All tops shall be turned up against walls, shall have horizontal and vertical corners coved on a 5/8" radius, shall have tops folded down-attached and sealed to walls. Serving table top edges shall be turned down 1-1/2" with edge folded or turned back. Soiled dish-table, drainboard, dish-washing top edges shall be finished with a 1-1/2" formed rolled edge. Rolled edges shall have corners rounded to 1-1/4" radius. Top shall be prepared for and join dishwasher and other fittings specified. Shelves shall have back edges turned up and front edges turned down at least 1-1/2", folded and reinforced for stability.
- D. Sound Deadening: All tops, drainboards, shelves, backsplashes shall receive a sprayed-on acoustic sound deadening undercoating 1/8" thick. All fixtures shall be properly masked and undercoating cut to a sharp line 1" from front edge of bracing channels. Finish sound deadening with sprayed-on coating of aluminum paint. Where sound deadening is applied after fixture is installed, it shall be brush applied to same thickness as sprayed-on application and painted.
- E. Core Material: Particleboard made with exterior glue
- F. Cross Bracing Under Metal Tops: All cross bracing shall be 14 gauge galvanized steel except where otherwise noted. Bracing shall be formed into channel section 8" wide with 1-1/2" web welded together under tops, or as detailed on the drawings. Bracing shall be approximately 2'-0" on center line of fixture. Corners shall be braced diagonally. Anchor bracing to wall.
- G. Inverted Channel Bracing: Shall have ends closed tightly and welded. Where bracing channels are exposed as at fixtures with curb-type edges, bracing shall have stainless steel ends or side. Bracing shall be tack welded or stud welded to underside of tops, and shall be bonded to tops with cohesive mastic

2.10 CLOSET SHELVING

- A. Grade: Custom
- B. Shelf Material: 3/4" thermoset decorative panel with 3mm PVC edge banding.
- C. Cleats: 3/4" thermoset decorative panel for fixed open shelving installations without full box cabinet construction.
- D. Wall standards and brackets for adjustable open shelving installation:
 - 1. Shelves under 12", zinc plated steel, adjustable 1" centers. K&V #80 standards with #180 brackets.
 - 2. Shelves 12" and deeper, zinc plated steel, adjustable 2" centers. K&V #87 standards with #187 brackets

2.11 PRE-FABRICATED METAL UTILITY STORAGE SHELVING UNITS

- A. Basis of Design: Penco - Product: Clipper Shelving System (800) 562-1000.
- B. Size: 24" Deep, 8-ft tall. Widths vary, see plans.
- C. Materials:
 - 1. Posts: All posts shall be punched for clip or nut and bolt construction. Shelves and accessories are to be vertically adjustable on 1" centers. Side sway braces or side panels to be attached to side flange of the posts
 - 2. Box Post: High strength role formed tubular steel box section
 - 3. Offset Angle Post: High strength role formed steel section
 - 4. Shelf Clip: One piece 14-gauge steel, zinc plated

5. Shelves: To be 18-gauge steel min. with vertical turn - down face and 90 degree return on all four sides and spot welded at laps. All shelves to have 800 pound load capacity
 6. Base Strip: To be 20-gauge steel
 7. Bin Fronts: To be 18-gauge steel 1" high
 8. Sway Braces: To be 12-gauge steel x 3/4"
 9. Wall Support Brackets: To be 12-gauge steel
 10. Overhead Braces: To be 12-gauge steel
 - D. Fabrication / Installation
 1. Install shelving systems in accordance with manufacturer's instructions
 2. Attach shelving posts to wall with wall attachment brackets and overhead bracing. Bracing to be continuous from wall shelving to freestanding shelving to wall or wall shelving. Bracing to comply with IBC requirements for seismic design.
 3. Align and level shelves and posts. Maintain dimensional tolerance with adjacent work.
 4. Start bottom shelf at 12 inches above finished floor and evenly space shelves above.
- 2.12 SHOP FINISHING
- A. Grade: Provide finishes of same grades as items to be finished, unless otherwise indicated.
 - B. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 09 painting Sections for finishing opaque-finished architectural woodwork.
 - C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - D. Transparent finish for stained architectural woodwork and veneer panels:
 1. Grade: Premium.
 2. AWI Finish System: Catalyzed polyurethane.
 3. Staining: Match Architect's sample.
 4. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 5. Filled Finish for Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.
 - a. Apply wash-coat sealer after staining and before filling.
 6. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

- 3.1 PREPARATION
 - A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
 - B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.
 - C. Ensure that mechanical and electrical items affecting this Section of work are properly placed, complete, and have been inspected by the Architect/Engineer prior to commencement of installation
- 3.2 INSTALLATION
 - A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
 - B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
 - C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
 - D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use

fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8" in 96" sag, bow, or other variation from a straight line. Set and secure casework in place; rigid, plumb and level.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips. Secure cabinet and counter bases to floor using appropriate angles and anchorages.
 - 4. Use fixture attachments in concealed locations for wall mounted components. Secure to backing concealed behind finish wall surface.
 - 5. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.
 - 6. Carefully scribe casework abutting other components, with maximum gaps of 1/32". Do not use additional overlay trim for this purpose.
 - 7. Countersink anchorage devices at semi-exposed locations. Conceal with caps to match surrounding surfaces.
 - 8. Coordinate installation of conduit, outlets and coverplates for electrical, phone and data devices installed in casework.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Align adjacent solid-surfacing-material and laboratory epoxy resin countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 3. Secure backsplashes to walls with adhesive.
 - 4. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
 - 5. Install metal knee braces for countertop support in locations indicated.
 - 6. Install cable grommets in locations shown and as directed by Architect.
 - 7. Seal-caulk all joints that can be considered a possible sanitation problem. Seal-caulk material Rubber Caulk 5000; applied with power-operated handgun and by qualified operator. Joint size shall not exceed 3/32 inches in width.
- H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- I. Refer to Division 09 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean casework, counters, shelves, hardware, fittings and fixtures.
- D. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

3.1 PROTECTION

- A. Protect finishes until Substantial Completion.

END OF SECTION 06 40 23

DIVISION 07 – THERMAL & MOISTURE PROTECTION

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SECTION 07 08 00 – TESTING OF AIR BARRIER AND BUILDING ENVELOPE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes, Contractor's requirements for testing of the air barrier and building envelope in the **Ticket/Restroom Building**. Air Barrier testing of the Grandstands/Locker Room Building is not required.
 - 1. References
 - 2. Air Barrier Code Requirements
 - 3. Air Barrier System Characteristics
 - 4. Quality Assurance
 - 5. Qualifications
 - 6. Responsibilities of Parties for Testing
 - 7. Execution of testing procedures
 - 8. Reporting

1.2 REFERENCES

- A. WAC 51-11C-040240 - Air Leakage
 - 1. IECC with Washington State Amendments, 2018, Sections C402.4, Air Leakage (Mandatory).
- B. National Environmental Balancing Bureau (NEBB):
 - 1. NEBB – Procedural Standards for Building Enclosure Testing.
- C. ASTM International:
 - 1. ASTM E1186 – Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
 - 2. ASTM E779 – Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
 - 3. ASTM E1827 – Standard Test Method for Determining Airtightness of Buildings Using an Orifice Blower Door.
- D. International Organization for Standardization (ISO):
 - 1. ISO 6781 – Qualitative Detection of Thermal Irregularities in Building Envelopes – Infrared Method.

1.3 AIR BARRIER CODE REQUIREMENTS

- A. A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope or any combination thereof. The air barrier shall comply with WAC 51-11C-402.1.1 and C402.1.2.
- B. The continuous air barrier shall be constructed to comply with the following:
 - 1. The air barrier shall be continuous for all assemblies that are in the thermal envelope of the building and across joints and assemblies.
 - 2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with code Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect, and mechanical ventilation.
 - 3. Recessed lighting fixtures shall comply with code section C402.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.
- C. Air Barrier Penetrations:
 - 1. Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed, or otherwise sealed in a manner compatible with the construction materials or location. Joints and seals shall be sealed in the same manner or taped with a moisture vapor-

permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed.

D. Building Test IAW Section C402.1.2.3

The completed building shall be tested and the air leakage rate of the building envelope shall not exceed 0.25 CFM/ft² at a pressure differential of 0.3 inches water gauge in accordance with ASTM E779 or an equivalent method approved by the code official. If the test result is greater than 0.25 CFM/ft², the contractor shall conduct visual inspections. The contractor will be responsible for sealing the identified leaks and providing documentation of the corrective actions taken. If the test results exceed 0.40 CFM/ft², the contractor will be responsible for taking all corrective actions and testing again. Further remedial work and retesting will be required until a leakage rate below 0.40 CFM/ft² is achieved. Results over 0.40 CFM/ft² will not be accepted. A report that includes the tested surface area, floor area, air by volume, stories above grade and leakage rates shall be submitted to the building owner and code official by the contractor after the required testing is performed. All responsibility for sealing the leaks and meeting all requirements of the air barrier testing are the responsibility of the contractor at their own cost. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the building owner and code official.

1.4 AIR BARRIER CHARACTERISTICS

A. The airtight components of the building enclosure and the joints, junctures and transitions between materials, products and assemblies forming the building enclosure are called the air barrier system. These are typically, but not limited to the following joints or assemblies where connections are made:

1. Foundation and walls
2. Walls and windows
3. Walls and doors
4. Different wall systems
5. Walls and roof
6. Walls and roof over unconditioned spaces
7. Walls, floors, and roofs across construction, control and expansion joints
8. Walls, floors and roofs to utility, pipe and duct penetrations through the air barrier

1.5 QUALITY ASSURANCE

- A. The contractor must engage the services of a qualified air barrier inspector to oversee the sequencing and installation of the air barrier component materials and assemblies, to oversee the proper joining and sealing of the materials and assemblies, and to oversee the sealing of penetrations of the air barrier materials and assemblies.
- B. The contractor will provide a Building Envelope technician, who shall prepare report forms in accordance with the requirements of the NEBB Procedural Standards for Building Envelope Testing.

1.6 QUALIFICATIONS

- A. The Air Barrier Testing agency shall be certified by one of the following organizations to perform inspections and testing:
1. National Environmental Balancing Bureau (NEBB)
 2. American Air Barrier Association (AABA)
- B. Air barrier inspector duties on this project shall be conducted in conjunction with the commissioning process. Air barrier inspection and testing are to be provided by the contractor. Commissioning services will be provided by the owner group. The Contractor shall employ an air barrier inspector that is certified as NEBB BET CP or AABA Air Barrier Specialist, by the organizations defined above.

1.7 RESPONSIBILITIES

- A. Responsibilities indicated for Architect/Engineer, General Contractor and Air Barrier Inspector/testing technician are provided only to clarify the process.

B. Architect/Engineer Responsibilities:

1. Furnish design narratives and plan sheet details or other documentation, including Owner Project Requirements and Basis of Design documentation, to outline the air barrier system, components, and construction thereof.
2. Provide a conformed set of contract documents pertaining to the air barrier, including but not limited to, drawings, specifications, approved submittals, current approved change orders and any contract modifications affecting the air barrier.
3. In the construction documents, clearly define the building enclosure boundary and indicate the location of the air barrier throughout the building including floors, walls and ceiling or roof area, square footage of areas to be tested within the air barrier boundaries, type and construction of assemblies within the air barrier and method of testing to be performed (Blower door or Building Air Moving Equipment Test Method).
4. Coordinate resolution of system deficiencies identified during testing, according to contract documents.

C. Contractor Responsibilities:

1. Construction Coordination and Testing: The contractor will provide the services of an approved air barrier testing consultant as defined above and a Building Envelope technician to provide the required reports during commissioning.
2. Coordination of Sub-Contractors: Provide coordination between the sub-contractors involved in the construction of the air barrier system; coordinate the sequence of construction to ensure the continuity of the air barrier system joints, junctures, penetrations, and transitions between materials and assemblies of materials and products from the substructure to walls to roof. Provide quality assurance procedures and verification as specified. Provide and facilitate inspections, tests and other quality control services specified or requested by the BE Technician.
3. Organize pre-construction conferences between the subcontractors involved in the construction or penetration of the air barrier system and the air barrier testing technician to discuss each sub-contractor's responsibilities to ensure air tight barrier in the different sections to be installed by the different sub-contractors.
4. Construct mock-up demonstrating each joint, juncture and transition between materials, products and assemblies of products specified in different specification sections and plan sheets to be installed. Mock up shall be reviewed and approved by the Owner, Architect and building envelope inspector/technician.
5. Develop a project schedule with input from the building envelope inspection firm that coordinates the work of their disciplines and provides adequate time in the construction process to allow for successful completion of building envelope testing and any remedial work.
6. Ensure the building enclosure is complete, including but not limited to, all structural components, the air and vapor barriers complete, door sweeps and weather stripping complete, floors and ceilings complete.
7. Provide all project preparation and setup for BE testing, including but not limited to, temporary sealing of intentional openings, removing ceiling tiles, opening access doors, opening interior doors and securing them so they do not close during testing. This may include preparation of adjoining spaces and staging the building so no people will be opening doors or windows during the envelope testing. A guide checklist is provided at the end of this specification.
8. Provide either temporary or permanent power for BE testing equipment.
9. Remove sufficient ceiling tiles for lay in ceilings, or open sufficient access panels for hard ceilings to equalize the pressure between the ceiling cavity and space being tested. Replace tiles at the conclusion of testing.
10. If the building equipment is to be utilized for testing, provide the following:
 - a) Ensure that all necessary building systems are complete and operating in a safe manner.
 - b) Complete the installation of permanent power systems serving the equipment to be used for the BE testing. Electrical systems shall be properly installed in

- accordance with all applicable codes to ensure the safety of personnel involved in the testing.
- c) Perform startup of all building systems in accordance with manufacturer's recommendations.
 - d) Complete the installation, programming, calibration and startup of all building control systems.
11. Upon completion of inspection, testing or similar services, it is the contractors responsibility to repair any deficiencies identified in the testing, repair damaged construction and restore substrates and finishes, protect construction exposed by or for quality control activities and protect repaired construction until the air barrier enclosure passes the requirements stated above.
- D. Building Envelope Inspector/Testing Technician
- 1. Provide necessary equipment and technical expertise to inspect building envelop and air barrier components, render opinion as to the quality of construction and adherence to applicable codes, and provide observation/testing reports to the building owner and code official as applicable upon completion of each inspection.
 - 2. Provide necessary equipment and conduct air barrier testing in accordance with applicable codes and guidelines. Upon completion of air barrier testing, provide the building owner and code official with a comprehensive report of findings.
 - 3. Assist the Architect/Consultant and Contractors in identifying issues with the construction team with recommended resolution of issues discovered during inspections and testing.
 - 4. Examine construction documents to become familiar with project requirements and discover conditions in systems/design that may preclude proper testing of the building envelope systems and equipment. Report deficiencies to the Architect for resolution.
- E. Reports
- 1. During construction of the building envelope, the inspector/technician shall inspect and document conditions at various stages and prepare a report citing the date, weather conditions, and observations as to the quality of work and pictures supporting the observations.
 - 2. Upon completion of testing, the building envelop test technician shall provide a report to the building owner and code official outlining the details of the test procedures, test results, any deficiencies discovered and recommended measures to correct the deficiencies.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. The building envelope testing technician or firm is responsible for providing equipment to be used in the testing of the air barrier. This includes, but is not limited to, blower door test apparatus, infrared camera, digital camera, and air pressurization measurement equipment.

PART 3 - EXECUTION

3.1 AIR BARRIER PRE-TEST READINESS CHECKLIST

- A. Prior to starting the air barrier testing, the contractor shall make the building ready for testing, utilizing the following checklist for guidance. Notify the building envelop testing agency or technician of any issues with items noted on the checklist. Completed checklist shall be submitted to the testing agency/technician prior to testing and verified prior to beginning the air barrier testing.
- B. Air Barrier Pre-Test Checklist Form – See form on the following page.

3.2 HVAC PREPARATION FOR BUILDING ENVELOPE TESTING

- A. Refer to Division 01 section "Testing and Inspection Services" for air leakage testing requirements and additional information required to complete the testing.

- B. HVAC Preparation: As specified in NEBB BET Procedural Standards – Table 8.1.
1. Seal exhaust fans with back draft dampers.
 2. Seal supply fans with back draft dampers.
 3. Close furnace room door (for furnace locations outside the test zone).
 4. Close combustion air intake dampers for boilers.
 5. Turn off recirculating air handlers, make-up air units, energy recovery units, supply fans, furnaces, fan coil units, boilers, gas hot water heaters and exhaust fans - All equipment requiring combustion air (including kitchen equipment).
 6. Seal outdoor air inlets and exhaust outlets (by dampers and/or masking) inside the test zone.
 7. Close and mask motorized dampers.
 8. Mask undampened HVAC openings.
 9. Seal ventilators designed for continuous use.
 10. Seal supply and exhaust ventilator dampers.
 11. Seal off ventilation to other zones.
 12. Seal window air conditioners and through wall air conditioners to outside air vent.
 13. Fill floor drains and plumbing traps.
 14. Seal all HVAC ducts going from inside the test zone to outside the test zone and back into the test zone.
 15. Isolate movement and mask gravity dampers.
- C. Contractor to provide a responsible HVAC technician with the authority to place the HVAC system in the correct mode for the pressure test. Allow the testing agency unhindered access to mechanical rooms, air handlers, exhaust fans, and outdoor air and exhaust dampers.
- D. Contractor to provide a responsible technician with access to and the authority to reset circuit breakers.
- E. Close and latch all windows and doors and allow no access in the test envelope during the test.
- F. Assist the testing agency representative in removing all door hardware and other objects that interfere with test equipment set-up
- G. No work shall be performed in the test area while the test is in progress. Comply with ASTM E779-10, 7.0, to ensure any occupational hazards associated with operating test fans are eliminated.

3.3 BUILDING AIR BARRIER TEST

- A. The building air barrier test shall follow the guidelines outlined in one or more references in paragraph 1.2 of this section. If the air barrier cannot be tested by pressurization and de-pressurization, then the building may be tested in the positive (pressurization) mode only.
- B. The fan pressurization test to determine final compliance with the air barrier requirements shall be conducted with all components of the air barrier system have been installed and inspected, and have passed any intermediate inspections or procedures as outlined in the construction documents. The test may be conducted before finishes that are not part of the air barrier system have been installed. For example, if suspended ceiling tile, interior gypsum board or cladding systems are not part of the air barrier system, the test may be conducted before they are installed. Also, any interior doors or pass through spaces and finishes that are not part of the air barrier may be completed after the air barrier test is conducted.
- C. Completed test results shall be reported to the building Owner and code official. If there are any remedial actions required to achieve a successful test, the Building Envelope Technician shall report them to the General Contractor for necessary action at the contractor's expense. The air barrier enclosure will be tested again until the air barrier passes at the required rate of leakage as required by the current edition of the energy code.

3.4 BLOWER DOOR TESTING GENERAL PROCEDURES

- A. The blower door shall be installed in an appropriate entry door, window or vent opening. The openings must be sealed or taped to avoid any air leakage at these points. Orient the blower door appropriately for pressurization or depressurization as required. Installation should have minimum of obstructions to airflow in and out of the building.

- B. Install the pressure measuring instrument across the building envelope. It is recommended that more than one location be utilized for the pressure measurement, being careful to avoid extremes in outside pressure (wind, architectural features that may interfere with accuracy of readings, etc.).
- C. Measure and record wind velocity, indoor and outdoor temperatures at the beginning of the test so that average values can be calculated.
- D. Before beginning test, zero the pressure sensor, then measure and record the baseline building differential pressure across the airflow measurement device with the blower off.
- E. Start the blower door fans and pressurize/depressurize the building to the highest induced pressure differential. Measure and record the building envelope pressure differential. If there are fluctuations in pressure due to wind, take pressure measurements on the windward and leeward sides of the building and average the readings. If the buildings height or building configuration causes internal building pressure fluctuations, then take multiple readings and average.
- F. Perform a minimum of 10 building envelop pressure differentials and corresponding airflow measurements in both the pressurization and de-pressurization modes (a total of 20 readings). Measurements shall be taken over a minimum of 10 seconds.
- G. Measure and record wind velocity, indoor and outdoor temperatures at the end of the test so that their average values can be calculated.
- H. Phased projects, or areas under renovation with new exterior envelops may be tested separately in lieu of a whole building test.

3.5 BUILDING AIR MOVING EQUIPMENT SYSTEM TEST GENERAL PROCEDURES

- A. If permitted by local code official, and approved by the Mechanical Engineer, building air movement equipment may be utilized to pressurize the building. If building equipment cannot achieve the required pressures as determined by traversing ductwork or by using airflow monitoring stations associated with the equipment, the blower door method must be used for the testing.
- B. Measure and record exterior wind velocity, indoor and outdoor temperature, and other pertinent data for the building size, area to be measured, etc.
- C. Two sets of data shall be taken, one identified as the higher differential pressure and the other as the lower differential value. A minimum of five measurements of the building envelope differential are to be taken for each value until a total of 10 airflow measurements are taken.
- D. At the end of testing, measure and record baseline data, indoor and outdoor temperatures and other pertinent data so measurement calculations can be performed.

3.6 THERMOGRAPHY TEST GENERAL PROCEDURES

- A. Test the building using infrared thermography technology in accordance with ASTM C1060 or ISA 6781. Take thermal images before the air barrier testing and again during the air barrier test so areas where there are envelope leaks are detected.
- B. If the building air barrier test fails, perform the thermography procedures before and during subsequent tests to document repairs or areas where deficiencies still exist.
- C. Provide a report including thermographic images in color and a color temperature scale for comparison. The report should identify the high temperature reading, outdoor air temperature and building indoor temperature in addition to the exterior wind speed and direction. Note any areas of deficiency in the building envelope, any recommended actions to remedy deficiencies, and note all actions taken to remedy deficiencies. The final report shall note that all deficiencies have been corrected or what areas could not be practicably repaired. Copies of the report shall be included in the O&M and Commissioning records.

END OF SECTION 07 08 00

AIR BARRIER PRE-TEST CHECKLIST

| BUILDING COMPONENT | ENVELOPE CONDITION | | GC INITIAL |
|--|--------------------|--------------------|------------|
| | CLOSED | OPEN | |
| Exhaust fans with back draft dampers | Sealed | No Preparation | |
| Supply fans with backdraft dampers | Sealed | No Preparation | |
| Mechanical Room doors if outside test zone | Closed | Closed | |
| Combustion air intake dampers for boilers | Closed | Closed | |
| Outside air damper for air handler inside test area | Sealed | Closed | |
| Outside air intake for air handler inside test area without damper | Sealed | No Preparation | |
| Exhaust, Air Handling Units, Make Up Air Units, Energy Recovery Units, Supply Fans, Furnaces, Fan Coil Units, Boilers, Gas Hot Water Heaters, All equipment requiring combustion air (including kitchen equipment, HVAC, etc.) | Off | Off | |
| Fan inlet grilles with motorized damper | Closed | Closed | |
| Fan inlet grilles without motorized damper | Sealed | No Preparation | |
| Ventilators designed for continuous use | Sealed | Sealed | |
| Supply and Exhaust ventilation dampers | Sealed | Held Closed | |
| Clothes Dryer | Off | Off | |
| Clothes Dryer if connected to dryer vent | No Preparation | No Preparation | |
| Vented combustion appliance | Off | Off | |
| Ventilation to other zones | Sealed | Sealed | |
| Windows | Closed and Latched | Closed and Latched | |
| Exterior Doors | Closed and Latched | Closed and Latched | |
| Window Air Conditioners | Sealed | No Preparation | |
| Through the wall AC outside air vent | Sealed | No Preparation | |
| All HVAC ducts going from inside test area to outside test area or outside into the test area | Sealed | Sealed | |
| All electrical conduits going from inside the test area to outside the test area or outside into the test area | Sealed | Sealed | |
| Openings within the test area (doors, windows, etc.) | Open | Open | |
| Floor drains and drain traps | Filled | Filled | |
| Elevator Pressure relief openings | Closed | Closed | |
| Elevator doors | Closed | Closed | |
| Elevator door frame spacing between the elevator door and frame if elevator connects an area outside the air barrier | Sealed | Open | |
| Elevator door frame spacing between the elevator door and frame if the elevator connects an area within the air barrier | Open | Open | |
| Rooms with exterior, non-ducted louvers (interior doors) | Closed | Closed | |
| Loading Dock Doors (interior doors) | Closed | Closed | |
| Other openings between test area and exterior | Closed or Sealed | Closed or Sealed | |

The above items have been completed and checked prior to air barrier testing

Contractor: _____ Test Technician: _____ Date: _____

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Cold-applied, emulsified-asphalt dampproofing. Install at sub-grade side of retaining walls and the exterior side of all foundation walls and footings. Do not expose above finish grade.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.
- B. Material Certificates: For each product, signed by manufacturers.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.4 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 COLD-APPLIED, EMULSIFIED-ASPALT DAMPPROOFING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ChemMasters Corp.
 - 2. Degussa Building Systems; Sonneborn Brand Products.
 - 3. Gardner Gibson, Inc.
 - 4. Henry Company.
 - 5. Karnak Corporation.
 - 6. Koppers Inc.
 - 7. Malarkey Roofing Products.
 - 8. Meadows, W. R., Inc.
 - 9. Tamms Industries, Inc.
- C. Trowel Coats: ASTM D 1227, Type II, Class 1.
- D. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- E. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
- F. VOC Content: 0.25 lb/gal. or less.

2.2 PROTECTION COURSE

- A. Protection Course: Unfaced, fan-folded, extruded-polystyrene board insulation, nominal thickness 1/4 inch with compressive strength of not less than 8 psi per ASTM D 1621.

2.3 MISCELLANEOUS MATERIALS

- A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.
- B. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- C. Patching Compound: Epoxy or latex-modified repair mortar of type recommended by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
 - 1. Proceed with dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.
 - 2. Test for surface moisture according to ASTM D 4263.

3.2 PREPARATION

- A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.
- C. Apply patching compound for filling and patching tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
 - 1. Apply additional coats if recommended by manufacturer or if required to achieve coverages indicated.
 - 2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.
 - 3. Allow 48 hours drying time prior to backfilling.
- B. Apply dampproofing to footings and foundation walls where opposite side of wall faces building interior.
 - 1. Apply from finished-grade line to top of footing, extend over top of footing, and down a minimum of **6 inches** over outside face of footing.
 - 2. Extend **12 inches** onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an **8-inch-** wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.
 - 4. Remove all dampproofing that is exposed after adjacent finish grade is achieved.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. On Concrete Foundations Foundation Walls: Apply 2 brush or spray coats at not less than **1.5 gal./100 sq. ft.** for first coat and **1 gal./100 sq. ft.** for second coat, or 1 trowel coat at not less than **4 gal./100 sq. ft.**
- B. On Unexposed Face of Concrete Retaining Walls: Apply 1 brush or spray coat at not less than **1.25 gal./100 sq. ft.**
- C. Apply from finish grade elevation to bottom of footings
- D. Seal items projecting through dampproofing surface with mastic. Seal watertight

3.5 INSTALLATION OF PROTECTION COURSE

- A. Install protection course over completed-and-cured dampproofing. Comply with dampproofing material manufacturer's written recommendations for attaching protection course.
 - 1. Support protection course with spot application of adhesive of type recommended by protection board manufacturer over cured coating.
 - 2. Install protection course within 24 hours of installation of dampproofing (while coating is tacky) to ensure adhesion.

3.6 CLEANING

- A. Remove dampproofing materials from surfaces not intended to receive dampproofing. Applied dampproofing shall not be visible once final finish grade is achieved or adjacent building element is set.
- B. Remove dampproofing materials, including protection board from surfaces exposed to view after finish grading is complete.

END OF SECTION 07 11 13

SECTION 07 18 13 – PEDESTRIAN TRAFFIC COATINGS – **BID ALTERNATES #1A & #1B**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fluid applied polyurethane traffic coating over concrete substrate.
 - 2.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Division 07: Joint Protection

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. D4258 - Standard Practice for Surface Cleaning Concrete for Coating.
 - 2. D4259 - Standard Practice for Abrading Concrete.
 - 3. D4260 - Standard Practice for Liquid and Gelled Acid Etching of Concrete.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Samples: 12 X 12 inch coating samples in selected color.
 - 2. Product Data: Include product description and performance characteristics.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications:
 - 1. Minimum 5 years experience in work of this Section.
 - 2. Licensed or certified by coating system manufacturer.
- B. Mockup:
 - 1. Size: 4 X 4 feet.
 - 2. Illustrate system components, color, and surface texture.
 - 3. Approved mockup may remain as part of the Work.
- C. Pre-Installation Conference:
 - 1. Convene at site 2 weeks prior to beginning work of this Section.
 - 2. Attendance: Architect, Owner, Contractor, Construction Manager, waterproofing applicator.
 - 3. Review and discuss Contract Documents, waterproofing system manufacturer's literature, job conditions, scheduling, and other matters affecting application as appropriate.
 - 4. Tour representative areas of waterproofing substrates, and discuss substrate construction, related items, work conditions, and materials compatibility.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials at minimum 75 degrees F; prevent damage to containers. Do not store for long periods in direct sunlight.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:

1. Do not apply coating when surface temperature is less than 40 degrees F or if precipitation is imminent.
2. Do not apply unless surfaces to receive coating are dry.

B. Concrete Substrate: Cured minimum 28 days.

1.7 WARRANTIES

- A. Furnish manufacturer's and applicator's 5 year warranty providing coverage against water leakage through coating system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
1. Basis of Design - Neogard Corporation Peda-Gard FC
 2. BASF Building Systems – equivalent to basis of design
 3. Tremco, Inc. – equivalent to basis of design
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Traffic Coating System:
1. Primer: Neogard 7797/7798 Urethan Primer
 2. Base Coat: Neogard FC7500/FC7960 Fas Cure Polyurethane Base Coat
 3. Wear Coat: Neogard FC7510/FC7961 Fast Cure Aromatic Urethane
 4. Top Coat: Neogard FC7510/FC7961 Fast Cure Aromatic Urethane
 5. Aggregate:
 - a. 20/80 Mineral Aggregate
 - b. Fabric Reinforcing: Neogard 86220 Tie Tex Fabric, 6" x 300'
 - c. Nominal Coating Thickness: 3/16"
 6. Joint sealer: Neogard 70991 Urethane Joint Sealant.
 7. Bond Coat Primer: Neogard 7797/7798 Urethane Primer
 8. Detail Prime/Coat for Cracks and Cold Joints: Neogard FC7500/FC7960 Fast Cure Polyurethane Base Coat.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean surfaces; remove loose and foreign matter that could impede adhesion or performance of coating.
- B. Patch damaged concrete areas to match adjacent areas, using 100 percent solids epoxy and sand.
- C. Etch concrete surfaces with 10 to 15 percent solution of muriatic acid to remove laitance and impurities. After acid has stopped foaming, thoroughly flush with water.
- D. Clean hairline cracks and construction joints in concrete. Rout out cracks over 1/16 inch in width to minimum 1/4 inch depth and apply joint sealant to inside area of crack only, not to adjacent surface.

3.2 APPLICATION

- A. Apply coating system in accordance with manufacturer's instructions.
- B. Apply primer at minimum rate required by manufacturer. Reapply conditioner if base coat is not applied within 24 hours after applying conditioner.
- C. Install sheet flashing at intersection of horizontal and vertical planes, after surface conditioner coat has dried and before base coat is applied.

3.3 FIELD QUALITY CONTROL

- A. Close drains and flood with water.
- B. After 24 hours, check for leaks. If leaks are encountered, repair and repeat test.
- C. Drain water when proven watertight.

3.4 ADJUSTING

- A. Clean area around damaged or leaking coatings; apply additional 12 mils dry film thickness coating material.

3.5 PROTECTION

- A. Do not allow traffic on coated surfaces until cured.

END OF SECTION 07 18 13

SECTION 07 21 13 - BOARD INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Board insulation at perimeter foundation walls.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Division 01 Section "Quality Requirements" for special building envelope mock-up.
 - a. Division 07 Section Roofing Insulation for insulation specified as part of roofing construction.
 - b. Division 09 Section "Gypsum Board" for installation in metal-framed assemblies of insulation specified by referencing this Section.
- C. Performance Requirements
 - 1. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements in conjunction with thermal insulating materials in this Section.

1.2 REFERENCES

- A. Comply with all References in effect, most active, or latest version as of the date of the Contract Documents.
- B. ASTM International (ASTM) (www.astm.org):
 - 1. C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 2. C203 - Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
 - 3. C209 - Standard Test Method for Cellulosic Fiber Insulating Board.
 - 4. C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - 5. C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - 6. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 7. E96 - Standard Test Method for Water Vapor Transmission of Materials.
 - 8. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
- C. Current International Building Code.

1.3 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide data on product characteristics, performance criteria, and limitations.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Samples: 12 by 12 inch samples of each insulation.

1.4 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.
 - 2. Applicator: Company specializing in performing the work of this section with minimum three years experience, approved/certified by manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

- a. Retain subparagraph below if test results are indicated with other product requirements in Part 2. Retain only test methods applicable to types of characteristics specified.
- b. Surface-Burning Characteristics: ASTM E 84.
- c. Retain subparagraph below only if products specified in Part 2 are part of a fire-resistance-rated assembly.
- d. Fire-Resistance Ratings: ASTM E 119.
- e. Pass-fail test in subparagraph below is for measuring combustibility and is referenced in codes to determine if elementary products are noncombustible. Only selected unfaced mineral-fiber insulation and unfaced cellular-glass insulation pass this test. Delete if not required. See Evaluations.
- f. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
 - 1. Protect plastic insulation as follows:
 - a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - b. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - c. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.
- B. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation

1.6 PROJECT/SITE CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate Work under provisions of Instructions to Bidders.
- B. Sequence work to ensure timely placement of insulation within construction spaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- C. Acceptable Manufacturers - Extruded Polystyrene Board Insulation XPS
 - 1. Dow Chemical. (www.building.dow.com)
 - 2. CertainTeed. (www.certainteed.com)
 - 3. Owens-Corning. (www.owenscorning.com)
 - 4. Substitutions of equivalent products under specification 01 60 00
- D. FOAM-PLASTIC FOUNDATION WALL BOARD INSULATION
 - 1. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
 - a. Available Manufacturers:
 - 1. DiversiFoam Products.
 - 2. Dow Chemical Company.
 - 3. Owens Corning.
 - 4. Pactiv Building Products Division.
 - b. Type IV, 1.60 lb/cu. ft., unless otherwise indicated.
 - c. **2.5 inches thick, R-15**

2.1 INSULATION FASTNERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
 - 1. Available Products:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
 - c. Gemco; Spindle Type.
 - 2. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.
 - a. Available Products:
 - 1. Gemco; Clutch Clip
 - 3. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
 - a. Available Products:
 - 1. AGM Industries, Inc.; TACTOO Adhesive.
 - 2. Eckel Industries of Canada; Stic-Klip Type S Adhesive.
 - 3. Gemco: Tuff Bond Hanger Adhesive.

2.2 ACCESSORIES

- A. Tape: Minimum 3 inches wide, pressure sensitive, waterproof, as recommended by Manufacturer.
- B. Liquid spray flashing: Provide insulation Manufacturer's recommended board joint commercial liquid spray flashing and sealant for sealing joints, seams, openings, counter-flashing and penetrations through the insulation layer

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 01.
- B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation.
- C. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances that may impede installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Substrate:
 - 1. Remove protrusions flush with adjacent surface.
 - 2. Remove dirt, dust, oil, grease, and other materials that could impair adhesion.

3.3 INSTALLATION

- A. General:
 - 1. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
 - 2. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
 - 3. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
 - 4. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- B. Foundation:
 - 1. Apply adhesive in continuous beads per board length at 1 bead per vertical foot minimum.
 - 2. Adhere boards to foundation wall perimeter, horizontally. Place boards in a method to maximize contact bedding. Butt ends tight to adjacent board and to protrusions.

3. Install on inside face of wall from top of footing to top of concrete slab elevation.
4. Butt edges and ends tight to adjacent boards, at perimeter, and around penetrations.
5. Cut and fit insulation tight at perimeter and around penetrations.
6. Tape seal to perimeter and at joints between insulation pieces.
7. If not otherwise indicated, extend insulation vertically a minimum of 24 inches below exterior grade line behind face of the foundation wall.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01.

3.5 PROTECTION

- A. Protect finished Work under provisions of Instructions to Bidders.
- B. Do not permit Work to be damaged prior to covering insulation.
- C. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 13

SECTION 07 21 16 - BLANKET INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Blanket insulation in exterior wall, floor, ceiling, and roof assemblies.
 - 2. Acoustical blanket insulation in interior walls where shown on Drawings.
 - 3. Blanket insulation for filling window/door shim spaces, crevices in exterior wall and roof.
 - 4. Acoustical/Sound attenuation batt insulation in interior walls where shown on Drawings.
 - 5. Acoustical/Sound absorbing insulation in custom constructed sound absorbing panel walls, reference Division 07 for related material for corrugated perforated panel facing system.
 - 6. Installation of vapor retarders specified in Division 07.
- B. Related Sections:
 - 1. Division 01 Section "Quality Requirements" for special building envelope mock-up.
 - a. Division 07 Section Roofing Insulation for insulation specified as part of roofing construction.
 - b. Division 09 Section "Gypsum Board" for installation in metal-framed assemblies of insulation specified by referencing this Section.
 - c. Division 22 Section "Plumbing Insulation."
 - d. Division 23 Section "HVAC Insulation."
- C. Performance Requirements:
 - 1. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements in conjunction with thermal insulating materials in this Section.
 - 2. Materials of this Section shall provide continuity of vapor and air barrier at building enclosure elements in conjunction with vapor retarders and air barriers.

1.2 REFERENCES

- A. Comply with all References in effect, most active, or latest version as of the date of the Contract Documents.
- B. ASTM International – American Society for Testing and Materials. (ASTM) (www.astm.org):
 - 1. C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus.
 - 2. C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 - 3. C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 4. C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
 - 5. C1289- Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
 - 6. D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
 - 7. D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 - 8. D2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics
 - 9. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 10. E96 - Standard Test Methods for Water Vapor Transmission of Materials.
 - 11. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
- C. Current International Building Code.

1.3 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide data on product characteristics, performance criteria, and limitations.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Quality Control Submittals:

1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.
- F. WSSP Requirements: IEQ 3.1 - Product Data for building insulation to be Greenguard certified or specified as no added ureaformaldehyde resins used during manufacturing.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years' experience.
 2. Applicator: Company specializing in performing the work of this section with minimum three (3) years' experience, approved/certified by Manufacturer.
- B. Fire Hazard Classification:
1. Noncombustible, tested to ASTM E136.
 2. Flame spread/smoke developed rating of 25/50 or less, tested to ASTM E84.
- C. Pre-Installation Conference
1. Convene one week prior to commencing work of this section, under provisions of Division 01.

1.5 DELIVERY, STORAGE, AND HANDLING – NOT USED.

1.6 PROJECT/SITE CONDITIONS

- A. Store insulation in clean, dry, sheltered area, off ground or floor, until used. Protect against wetting and moisture absorption

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the Work with Division 07 – Vapor Retarder and Division 07 – Air Barrier.
- B. Coordinate Work under provisions of Division 01.
- C. Sequence work to ensure timely placement of insulation within construction spaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Batt and Blanket Insulation:
1. Knauf Insulation. (www.knaufinsulation.us)
Product: Faced and unfaced fiberglass batt and blanket insulation.
 2. Owens-Corning. (www.owenscorning.com)
 3. Substitutions: Under provisions of Division 01.
- B. Sound Insulation:
1. Knauf Insulation. (www.knaufinsulation.us)
Product: Unfaced fiberglass batt sound attenuation insulation.
 2. Owens-Corning. (www.owenscorning.com)
 3. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Exterior Stud Walls: Unfaced pre-formed glass mineral fiber batt, friction fit (where interior vapor barrier and wall finish is indicated).
1. Thermal Insulation
 - a. Thermal resistance: R of 13 (4 inch nominal walls), R of 21 (6 inch nominal walls) and R of 25 (8 inch nominal walls).
 - b. Batt width: Match framing spacing for friction fit.
- B. Miscellaneous wall infill framing (above finish): Faced pre-formed glass mineral fiber batt.
1. Thermal Insulation
 - a. Thermal Resistance: R of 21 (6 inch nominal walls)
 - b. Batt width: Match framing spacing and provide extra wide stapling flanges as required for installation shown.
 - c. Facing FSK (Foil-Scrim-Kraft) vapor retarder facing.

- C. Interior stud walls: Unfaced pre-formed glass mineral fiber sound attenuation batt insulation, friction fit.
 - 1. Acoustic insulation, ASTM C665 Type I, ASTM E136
 - a. Minimum of 10 STC improvement.
 - b. Thickness as required to fill nominal stud cavity (3.5 or 5.5 inch)
 - c. Batt width (5-1/4 inch, 22 or 16 inch as required for friction fit).

2.3 INSULATION FASTNERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
 - 1. Available Products:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
 - c. Gemco; Spindle Type.
 - 2. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.
 - a. Available Products:
 - 1. Gemco; Clutch Clip
 - 3. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
 - a. Available Products:
 - 1. AGM Industries, Inc.; TACTOO Adhesive.
 - 2. Eckel Industries of Canada; Stic-Klip Type S Adhesive.
 - 3. Gemco; Tuff Bond Hanger Adhesive.

2.4 ACCESSORIES AND MATERIALS

- A. Include insulation baffles where required for continuous ventilation. Include dimensional lumber furring strips as staple flanges to span truss webs where insulation is indicated at margin below top chord of trusses.
- B. Tape: Minimum 4 inches wide, pressure sensitive, foil faced, waterproof.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 01.
- B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation.
- C. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances that may impede installation.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION

- A. Install in accordance with NAIMA "Recommendations for Installation in Residential and Other Light-Frame Construction – Fiber Glass Building Insulation" and manufacturer's instructions.
- B. Surface Application: Apply insulation directly to surface with appropriate spindle or prong-type anchors.
 - 1. Fasten anchors to steel surfaces by welding the pin to metal or by using pre-attached heads and welded through the insulation.
 - 2. Fasten anchors to other substrates with adhesive. Follow manufacturer's recommendations for surface preparation and adhesive pattern.
 - 3. Impale insulation on anchor and secure with washer.

4. Select pin lengths to ensure tight fit. Protect pin tips where subject to human contact
5. See manufacturer's diagram for impaling pin pattern.
- C. Between Studs, Rafters, and Joists:
 1. Unfaced Insulation: Friction fit insulation between framing members after cover material has been installed on one side of cavity. In applications without a cover material, use wire or metal straps to hold insulation in place.
 2. Faced Insulation: Staple attachment flanges to face or side of framing member every 8 to 12 inches (200 to 305 mm) on verticals, every 6 to 8 inches (150 to 200 mm) on horizontals and slopes.
 3. Faced Insulation: Friction fit insulation between framing members after cover material has been installed on one side of cavity. In applications without a cover material, use wire or metal straps to hold insulation in place.
- D. Between open web roof trusses:
 1. Provide supplemental furring strips each side of each truss to provide a staple flange and/or wire support attachment points. Margin furring down from roof sheathing to provide for thickness of insulation plus the air gap space indicated between top of insulation and underside of roof sheathing where wire is used.
 2. Provide 16 or 18 gage wire running diagonally or perpendicular to insulation spaced at 18 to 24 inches.
- E. Between Open Web Bar Joists:
 1. Secure with 16 or 18 gage wire running diagonally or perpendicular to insulation, spaced at 18 to 24 inches (460 to 610mm).
- F. Over Suspended Ceilings:
 1. Install insulation with face contacting back of ceiling panels; butt insulation tightly together at edges to prevent thermal leaks.
- G. Maintain vapor retarder integrity by tightly abutting adjacent insulation.
- H. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- I. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- J. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- K. Install 3-inch- thick or 5-inch thick, unfaced sound attenuation blanket insulation in walls indicated and over suspended ceilings at partitions in a width that extends insulation 48 inches on either side of partition.
- L. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
- M. Insulation Tape:
 1. Repair punctures or tears in vapor retarder facing by taping.
 2. Follow tape Manufacture's application recommendations.
 3. Apply with vapor barrier facing towards interior of structure.
 4. Tape seal lapped flanges, butt ends, and tears and holes in facings.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01.

3.5 PROTECTION

- A. Protect finished Work under provisions of Division 01.
- B. Do not permit Work to be damaged prior to covering insulation.

END OF SECTION 07 21 16

SECTION 07 21 29 - SPRAYED INSULATION

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fiber Insulation Spray applied to achieve a thermal and air seal.
 - 2. Spray polyurethane foam insulation at all exterior wall and roof envelope voids and crevices including but not limited to: walls, door frames, window frames, skylights, roof deck, deck flutes, roof curbs and storefront conditions. Do not overfill void.
 - 3. Spray polyurethane foam insulation at all interior sound rated wall voids and crevices including but not limited to: walls, door frames, relite frames, and roof/ceiling deck. Note: filling voids shall occur at any wall shown to include acoustical insulation in the wall type. Do not overfill void.
- B. Performance Requirements:
 - 1. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements in conjunction with thermal insulating materials in this Section.
 - 2. Materials of this Section shall provide continuity of vapor and air barrier at building enclosure elements in conjunction with vapor retarders and air barriers.
- C. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Division 01 Section "Quality Requirements" for special building envelope mock-up.
 - a. Division 04 Section "Masonry" for block unit insulation.
 - b. Division 09 Section "Gypsum Board" for installation in metal-framed assemblies of insulation specified by referencing this Section.
 - c. Division 22 Section "Plumbing Insulation."
 - d. Division 23 Section "HVAC Insulation."

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 2. C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 3. C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
 - 4. C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facing.
 - 5. D1621 - Standard Test Method of Compressive Properties of Rigid Cellular Plastics.
 - 6. D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 - 7. D2126 - Standard Test Method for Response for Rigid Cellular Plastics to Thermal and Humid Aging.
 - 8. D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics
 - 9. D5116 - Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
 - 10. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 11. E96 - Standard Test Methods for Water Vapor Transmission of Materials
 - 12. E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 13. E1623 - Standard Test Method for Determination of Fire and Thermal Parameters of Materials, Products, and Systems Using and Intermediate Scale Calorimeter (ICAL)
- B. Current International Building Code.

1.3 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide data on product characteristics, performance criteria, and limitations.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Quality Control Submittals
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Minimum five (5) years documented experience in work of this Section.
- B. Fire Hazard Classification: Maximum flame spread/smoke developed rating of 25/450, tested to ASTM E84.
- C. Qualifications
 - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
 - 2. Applicator: Company specializing in performing the work of this section with minimum three years experience, approved/certified by manufacturer.
- D. Pre-Installation Conference
 - 1. Convene one week prior to commencing work of this section, under provisions of Instructions to Bidders.

1.5 PROJECT CONDITIONS

- A. Do not apply insulation when air or surface temperature is less than 50 degrees F, nor when such temperatures are anticipated within 24 hours after application.
- B. Consult Manufacturer for application procedures during excessively humid or other adverse weather conditions.
- C. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the Work with Division 07 for installation of weather barrier and vapor retarders.
- B. Do not position ducts, piping, conduit, and other suspended equipment that will interfere with uniform application until after application.
- C. Place conduit, boxes, wiring, plumbing lines, and other components prior to application of insulation where these can be anticipated in advance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. CertainTeed Corp. (www.certainteed.com)
 - 1. Product: Closed Cell Certa-Spray Foam
- B. BASF Corporation (www.basf.com)
 - 1. Product: Spraytight
- C. BaySystems North America, LLC. (www.baysystems-northamerica.com)
 - 1. Product: Ecobay
- D. Dow Chemical Company (www.dow.com)
 - 1. Product: Froth-Pak
- E. Icynene (www.icynene.com)
 - 1. Product MD-C-200
- F. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Closed Cell Polyurethane Foam Insulation:
 - 1. ASTM C1029, Type II, with maximum flame-spread and smoke-developed indexes of 25 and 460, respectively, per ASTM E84.

2. Thermal Performance (aged): Tested in accordance with ASTM C518 and/or ASTM C177 at 75 degrees F mean temperature.
 - a. Thickness 1 inch, R-Value 5.8 (h-ft2-degreedF)/Btu.
 - b. Thickness 6 inches, R-Value 38.4 (h-ft2-degreedF)/Btu.
3. Apply to a thickness to achieve a minimum R rating of 38. (Approximately 6 inches thick).
4. Physical and Mechanical Properties:
 - a. Core Density: 1.9-2.4 pcf when tested in accordance with ASTM D1622.
 - b. Thermal Resistance (Initial): 6.4 when tested in accordance with ASTM C518 at 75 degrees F, (h-ft2 – degrees F)/Btu.
 - c. Closed Cell Content: 88-95 percent when tested in accordance with ASTM D2842.
 - d. Compressive Strength: Greater than 25 psi when tested in accordance with ASTM D1621.
 - e. Tensile Strength: 23 psi when tested in accordance with ASTM E1623.
 - f. Water Absorption: Less than 2 percent by volume when tested in accordance with ASTM D2842.
 - g. Dimensional Stability: Less than 9 percent by volume when tested in accordance with ASTM D2126 at 75 degrees F/95 percent RH, 28 Day.
 - h. Water Vapor Transmission: 1.3 perm/inch when tested in accordance with ASTM E96.
 - i. Air Permeability: 0.013 when tested in accordance with ASTM E283 at 1 inch thickness, L/s/m2.
 - j. Fungi Resistance: Pass, with no growth when tested in accordance with ASTM C1338.
5. Fire performance:
 - a. Flame Spread: Less than 25 when tested in accordance with ASTM E84.
 - b. Smoke: Less than 450 when tested in accordance with ASTM E84.
6. Products used within the building shell shall comply with the VOC limit requirements stated in section 01 81 14.

2.3 ACCESSORIES, MATERIALS AND FASTENERS

- A. Adhesive and anchoring attachment method as recommended by Manufacturer. Provide all materials required for complete and proper installation of insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 01.
- B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation.
- C. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances that may impede installation.

3.2 PREPARATION

- A. Clean surfaces to remove oil, grease, dirt, and other materials that could impair bond.
- B. Test painted steel surfaces to verify that paint will not impair bond.
- C. Protect adjacent surfaces from accidental application.
- D. Coordinate foam-in-place injection holes with masonry bond beams.

3.3 APPLICATION

- A. Install in strict accordance with Manufacturer's published instructions.
- B. Product must be installed according to local code, and must be applied by a qualified applicator.
- C. Fill all open cells of exterior masonry walls not grouted-solid. Reference drawings for locations. Patch masonry injection holes for smooth surface.
- D. Apply insulation by spray method, to uniform monolithic density without voids.
- E. Apply to achieve thermal resistance R-Value of 38 minimum.
- F. Apply insulation to seal voids at truss ends to prevent wind scouring of ceiling insulation.

- G. Seal plumbing stacks, electrical wiring and other penetrations into attic to control air leakage.
- H. Do not install spray foam insulation in areas where it will be in contact with equipment or materials with operating temperatures of 180 degrees F or greater.
- I. Apply insulation in unvented roof spaces and cathedral ceiling areas.
- J. Fill all perimeter building envelope voids for air tightness standards of the Energy Star Program. In-fill all voids with spray insulation for complete thermal and air seal.
- K. Apply sealant to joints between structural assemblies as specified in 079200 – Joint Sealants.
- L. Inspection will include verification of insulation and density.

3.4 ADJUSTING

- A. Inspect areas for complete coverage; correct unacceptable work and patch.
- B. Patch damaged and cut areas.
- C. Replace areas where excessive shrinkage or cracking is evident.

3.5 PROTECTION

- A. Protect finished Work under provisions of Instructions to Bidders.
- B. Do not permit Work to be damaged prior to covering insulation.

END OF SECTION 07 21 29

SECTION 07 24 00 – INSULATION & FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Manufacturer's requirements for the proper design, use, and installation of an Exterior Insulation and Finish System.

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete
- B. Section 04 22 00 - Unit Masonry Assemblies
- C. Section 06 16 43 – Gypsum Sheathing
- D. Section 07 62 00 - Sheet Metal Flashing and Trim
- E. Section 07 92 00 - Joint Sealants
- F. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts
- G. Section 09 21 16 - Gypsum Board Assemblies

1.3 REFERENCES

- A. ASTM B117 Test Method for Salt Spray (Fog) Testing
- B. ASTM C1135 Test Method for Determining Tensile Adhesion Properties of Structural Sealants
- C. ASTM D2247 Practice for Testing Water Resistance of Coatings in 100 Percent Relative Humidity
- D. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E119 Standard Test Method for Fire Tests of Building Construction and Materials.
- F. ASTM E330 Test Method for Structural Performance by Uniform Static Air Pressure Difference.
- G. ASTM E331 Test Method for Water Penetration by Uniform Static Air Pressure Difference.
- H. ASTM E695 Method for Measuring Relative Resistance to Impact Loading.
- I. ASTM E2134 Standard Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS)
- J. ASTM E2273 Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
- K. ASTM E2430 Standard Specification For Expanded Polystyrene ("EPS") Thermal Insulation Boards For Use In Exterior Insulation and Finish Systems ("EIFS")
- L. ASTM E2485 Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings
- M. ASTM E2486 Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
- N. ASTM E2570 Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
- O. ASTM G155/ Accelerated Weathering for Exposure of Nonmetallic Materials. G153
- P. N FPA 259 Test Method for Potential Heat of Building Materials.
- Q. N FPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source.
- R. N FPA 285 Standard Method of Test for the Evaluation of Flammability characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components Using the Intermediate-scale, Multistory Test Apparatus.

1.4 ASSEMBLY DESCRIPTION

- A. Optimum WaterMaster: An Exterior Insulation and Finish System (EIFS) consisting of Adhesive, Expanded Polystyrene Insulation (EPS) Board, Base Coat with embedded Reinforcing Fabric Mesh, Primer, and Finish Coat. This system is installed over a roll on water-resistive barrier consisting of Parex USA Weatherseal Spray & Roll-on and Parex Flashing Membrane applied over glass mat gypsum sheathing, cement board sheathing, concrete or CMU.
- B. Functional Criteria:

1. General:
 - a. Insulation Board: At system termination, completely encapsulate insulation board edges by mesh reinforced base coat, substrate or drainage track (limited to terminations at foundation). The use of and maximum thickness of insulation board shall be in accordance with applicable building codes and EIFS manufacturer's requirements.
 - b. Flashing: Flashing shall be continuous and watertight. Flashing shall be designed and installed to prevent water infiltration behind the cladding. Refer to Division 07 Flashing Section for specified flashing materials.
 - c. The configuration of the water resistive barrier, drainage plane and flashing and Parex materials, must allow for the egress of incidental moisture.
 - d. See Current ICC Evaluation Service Report or Contact Parex Technical Department for Design Windloads.
 - e. Inclined surfaces shall follow the guidelines listed below:
 1. Minimum slope: 6 in (152 mm) of vertical rise in 12 in (305 mm) of horizontal run.
 2. For sloped surfaces, run of slope shall be a maximum of 12 in (305 mm).
 3. Usage not meeting above criteria shall be approved in writing prior to installation.
 - f. The building interior shall be separated from the insulation board by 1/2 in (12.7 mm) of gypsum board or equivalent 15 minute thermal barrier.
2. Performance Requirements
 - a. System to meet the performance and testing requirements of the International Code Council Acceptance Criteria AC 212 and AC 212
 - b. Shall meet the testing requirements of the Product Performance Sheet.
3. Substrate Systems:
 - a. Shall be engineered to withstand applicable design loads including required safety factor.
 - b. Maximum deflection of substrate system under positive or negative design loads shall not exceed L/240 of span.
 - c. Substrate dimensional tolerance: Flat within 1/4 in (6.4 mm) in any 4 ft (122 cm) radius.
 - d. Surface irregularities: Sheathing not over 1/8 in (3 mm); masonry not over 3/16 in (4.8 mm).
4. Impact Resistance Classification:
 - a. Standard Impact Resistance, 25-49 in-lbs (2.8 – 5.6 J) Impact Range
5. Expansion Joints: Continuous expansion joints shall be installed at the following locations in accordance with manufacturer's recommendations:
 - a. At building expansion joints.
 - b. At substrate expansion joints.
 - c. Where EIFS panels abut one another.
 - d. Where EIFS abuts other materials.
 - e. Where significant structural movement occurs, such as at
 1. Changes in roof line.
 2. Changes in building shape and/or structural system.
 - f. Where substrate changes
 - g. Substrate movement and expansion and contraction of EIFS and adjacent materials shall be taken into account in design of expansion joints, with proper consideration given to sealant properties, installation conditions, temperature range, coefficients of expansion of materials, joint width to depth ratios, and other material factors. Minimum width of expansion joints shall be as follows:
 1. 1/2 in (12.7 mm) where EIFS abuts other materials.
 2. 3/4 in (19 mm) when EIFS abuts the EIFS.
 3. Larger width where indicated on drawings.
6. Manufacturer's Detail:
 - a. EIFS latest published information shall be followed for standard detail treatments.

- b. Non-standard detail treatments shall be as recommended by manufacturer, approved by Project Designer and be part of the Contract Documents.
 - 7. Building Code Conformance: EIFS shall be acceptable for use on this project under building code having jurisdiction.
- 1.5 SUBMITTALS
 - A. General: Submit Samples, Evaluation Reports, warranties and Certificates in accordance with Division 01 General Requirements Submittal Section.
- 1.6 QUALITY ASSURANCE
 - A. Products manufactured under ISO 9001:2000 Quality System.
 - B. Qualifications:
 - 1. All EIFS assembly materials must be manufactured or sold by a single-source manufacturer and must be purchased direct from the manufacturer or its authorized distributor.
 - 2. Applicator:
 - a. Must have attended manufacturer's Educational Seminar.
 - b. Must possess a current manufacturer's certificate of education.
 - c. Must be experienced and competent in installation of plaster-like materials.
 - C. Regulatory Requirements:
 - 1. Insulation Board: Shall be produced and labeled under a third party quality program as required by applicable building code.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Delivery: Deliver materials in original packaging with manufacturer's identification.
 - B. Storage: Store materials in a cool, dry location, out of sunlight, protected from weather and other harmful environment, and at a temperature above 40°F (4°C) and below 110°F (43°C) in accordance with manufacturer's instructions.
- 1.8 PROJECT / SITE CONDITIONS
 - A. Installation Ambient Air Temperature: Minimum of 40°F (4°C) and rising, and remain so for 24 hours thereafter.
 - B. Substrate Temperature: Do not apply materials to substrates whose temperature are below 40°F (4°C) or contain frost or ice.
 - C. Inclement Weather: Do not apply materials during inclement weather unless appropriate protection is employed.
 - D. Sunlight Exposure: Avoid, when possible, installation of the materials in direct sunlight. Application of Acrylic Finishes in direct sunlight in hot weather may adversely affect aesthetics.
 - E. Materials shall not be applied if ambient temperature exceeds 120°F (49°C) or falls below 40°F (4°C) within 24 hours of application. Protect materials from uneven and excessive evaporation during hot, dry weather.
 - F. Prior to installation, the wall shall be inspected for surface contamination, or other defects that may adversely affect the performance of the materials and shall be free of residual moisture.
- 1.9 COORDINATION AND SCHEDULING:
 - A. Coordination: Coordinate water-resistive membrane & air barrier coating materials installation with other construction operations.
- 1.10 WARRANTY
 - A. Provide manufacturer's Standard Limited Warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer, Basis of Design: Parex USA, Inc., 4125 E. La Palma Ave., Suite 250, Anaheim, CA 92807 Contact: Architectural Sales (866.516.0061) or Technical Support (800.226.2424).
- B. Components: Obtain components from authorized distributors. No substitutions or additions of other materials are permitted without prior written permission from the EIFS manufacturer for this project.
- C. Substitutions under provisions of Division 01.

2.2 MATERIALS

- A. Secondary Water-Resistive Barrier
 - 1. Parex USA Weatherseal Spray & Roll-on™ roll-on water resistive barrier coating
 - 2. Parex USA 396 Sheathing Tape: Non-woven synthetic fiber tape to reinforce Weatherseal Spray & Roll-on water-resistive barrier at sheathing board joints, into rough openings and other terminations into dissimilar materials available in 4 in, 6 in and 9 in.
 - 3. Parex 365 Flashing Membrane: Self sealing, Polyester faced, rubberized asphalt membrane, 30 mils (0.76 mm) thick.
- B. Adhesives
 - 1. Parex 121™ Optimum Base Coat & Adhesive: 100% acrylic polymer based, requiring the addition of Portland cement; used as an adhesive to laminate EPS Insulation Board to the Weatherseal Spray & Roll-on water-resistive barrier.
 - 2. Parex 121 Optimum Dry Base Coat & Adhesive: Copolymer based, factory blend of cement and proprietary ingredients; requiring the addition of water only, used as an adhesive to laminate EPS Insulation Board to the Weatherseal Spray & Roll-on water-resistive barrier.
- C. Insulation Board: In compliance with manufacturer's requirements for Standard System EIFS.
 - 1. Produced and labeled under a third party quality program as required by applicable building code; and produced by a manufacturer approved by Parex USA.
 - 2. Shall conform to ASTM C578 and ASTM E2430, Type I and the Parex USA specification for Molded Expanded Polystyrene Insulation board.
 - 3. Maximum size shall be 2 ft x 4 ft (610 mm x 1219 mm).
 - 4. Thickness: ¾ in, minimum (19 mm) after rasping. Refer to drawings for required thicknesses.
 - 5. Refer to specification section 07 21 13.
- D. Base Coats:
 - 1. 121 Optimum Base Coat: 100% acrylic polymer base, requiring the addition of Portland cement.
 - 2. 121 Optimum Dry Base Coat: Copolymer based, factory blend of cement and proprietary ingredients requiring addition of water.
 - 3. 302 ABC-N1 Base Coat & Adhesive: 100% acrylic polymer base, ready to use, applied without the addition of cement.
- E. Reinforcing Mesh:
 - 1. 355 Standard Mesh: Weight 4.5 oz. per sq. yd. (153 g/sq m); coated for protection against alkali. Standard reinforcement of Parex EIFS, or for use with High Impact 358.14 Mesh, or Ultra High Impact 358.20 Mesh.
 - 2. 356 Short Detail Mesh: Reinforcing mesh used for backwrapping and details.
 - 3. 352 Self Adhesive Detail Mesh: Reinforcing mesh used for complex details.
- F. Primer:
 - 1. Parex USA Primer: 100% acrylic based coating to prepare surfaces for acrylic or elastomeric finishes.
 - 2. Variance VariPrime Sanded: 100% acrylic based coating to prepare surface for exposed aggregated specialty finishes.
- G. Finish

1. Parex AquaSol: 100% acrylic polymer based finish, enhanced DPR acrylic finish with hydrophobic and photocatalytic properties, repels water, reflects UV rays, and reduces smog particles near the finish surface. Finish type, texture and color as selected by Architect.
 - a. Parex USA ColorFast Pigments System: Fade resistant pigment system offering **superior** fade resistance; factory tinted only; used-with any Parex USA acrylic or elastomeric finish or coating.
 2. Parex USA Clear Sealer: 100% acrylic, transparent, permeable, dirt resistant sealer for use as a protective coating over acrylic finishes. Use 610 Matte Clear.
 - H. Parex USA 369 DrainEdge™: Pre-punched strip of non-woven fabric to allow for drainage at the head of system penetrations.
 - I. Water: Clean, cool, potable water
 - J. Portland Cement: ASTM C150, Type I or Type I-II.
- 2.3 RELATED MATERIALS AND ACCESSORIES
- A. Substrate Materials:
 1. Glass mat gypsum sheathing conforming to ASTM C1177.
 2. Cement Fiber Sheathing conforming to ASTM C1325
 3. Gypsum Sheathing: Minimum 1/2 in (13 mm) thick, core-treated, weather-resistant, exterior gypsum sheathing complying with ASTM C1396.
 4. Concrete Masonry Units (CMU): Non-painted (uncoated).
 5. Concrete (poured or pre-cast).
 6. Other approved by manufacturer writing prior to the project.
 - B. Flashing: Refer to Division 07 Flashing Section for flashing materials.
 - C. Sealant System:
 1. Sealant for expansion joints between panelized EIFS sections shall be ultra-low modulus designed for minimum 100% elongation and minimum 50% compression and as selected by Project Designer.
 2. Sealant for perimeter seals around window and door frames and other wall penetrations shall be low modulus, designed for minimum 50% elongation and minimum 25% compression, and as selected by Project Designer.
 3. Sealants shall conform to ASTM C 920, Grade NS.
 4. Expansion joints between sections of EIFS shall have a minimum width of 3/4 in (19 mm).
 5. Perimeter seal joints shall be a minimum width of 1/2 in (12.7 mm).
 6. Sealant backer rod shall be closed-cell polyethylene foam.
 7. Apply sealant to tracks or base coat of EIFS.
 8. Refer to EIFS manufacturer's current bulletin for listing of sealants which have been tested and have been found to be compatible with EIFS materials.
 9. Color shall be as selected by Architect.
 10. Joint design, surface preparation, and sealant primer shall be based on sealant manufacturer's recommendations and project conditions

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify project site conditions under provisions of Section 01 00 00.
- B. Compliance: Comply with manufacturer's instructions for installation.
- C. Substrate Examination: Examine prior to installation of EIFS assembly materials as follows:
 1. Substrate shall be of a type approved by manufacturer.
 2. Substrate shall be examined for soundness, and other harmful conditions.
 3. Substrate shall be free of dust, dirt, laitance, efflorescence, and other harmful contaminants.
 4. Substrate construction in accordance with substrate material manufacturer's specifications and applicable building codes.
 5. Maximum deflection of the substrate shall be limited to L/240.

- D. Sealants and Backer Rod: To be installed, where required, in accordance with the sealant manufacturer's specifications and published literature, and using the sealant manufacturer's recommended primers.
- E. Advise Contractor of discrepancies preventing proper installation of the EIFS materials. Do not proceed with the work until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Protection: Protect surrounding material surfaces and areas during installation of system.
- B. Clean surfaces thoroughly prior to installation.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 MIXING

- A. Mix materials in accordance with manufacturer's instructions.

3.4 APPLICATION

- A. General: Installation shall conform to this specification and manufacturer's written instructions.
- B. Drainage Accessories and Water Resistive Barrier
 1. Install drainage tracks (limited to terminations at foundations), back-wrap mesh, or edge-wrap mesh at system terminations. Treat all glass mat gypsum sheathing, cement board sheathing, OSB and plywood joints with Weatherseal Spray & Roll-on water-resistive barrier and embed Parex 396 Sheathing Tape.
 2. Flash all rough openings with Weatherseal Spray & Roll-on water-resistive barrier and embedded Parex 396 Sheathing Tape or Parex Flashing Membrane.
 3. Apply Weatherseal Spray & Roll-on Water-resistive barrier to the surface of the appropriate substrate (in accordance with product data sheet).
 4. Treat the heads of all window, door and similar openings with Parex DrainEdge and back-wrap mesh to allow for drainage at these locations.
- C. Insulation Board
 1. Apply Parex adhesive to backs of insulation boards with a Parex drainage notched trowel, with ribbons of adhesive oriented in a vertical direction (parallel to the 2 ft (61 mm)) dimension of the EPS board). Apply a 1 in (25.4 mm) wide horizontal ribbon of adhesive on the back at the lower edge of insulation boards installed over DrainEdge.
 2. Install insulation board without gaps in a running bond pattern and interlocked at corners.
 3. Rasp irregularities off insulation board.
- D. Apply base coat and fully embed mesh in base coat; include diagonal mesh patches at corners of openings and reinforcing mesh patches at joints of track sections. Apply multiple layers of base coat and mesh where required for specified impact resistance classification.
- E. Apply primer to base coat after drying. Primer may be omitted if it is not required by the manufacturer's product data sheets for the specified finish coat or otherwise specified for the project.
- F. Finish Coat: Apply finish coat to match specified finish type, texture, and color. Do not apply finish coat to surfaces to receive sealant. Keep finish out of sealant joint gaps.

3.5 CLEAN-UP

- A. Removal: Remove and legally dispose of EIFS materials from job site.
- B. Clean surfaces and work area of foreign materials resulting from material installation.

3.6 PROTECTION

- A. Provide protection of installed materials from water infiltration into or behind them.
- B. Provide protection of installed materials from dust, dirt, precipitation, and freezing during installation, and continuous high humidity until fully cured and dry.
- C. Clean exposed surfaces using materials and methods recommended by the manufacturer of the material or product being cleaned. Remove and replace work that cannot be cleaned to the satisfaction of the Architect/Owner.

END OF SECTION 07 24 00

SECTION 07 26 00 - VAPOR RETARDERS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sheet and sealant materials for controlling vapor diffusion at exterior walls.
 - 2. Sheet and sealant materials for controlling vapor diffusion at floors.
 - 3. Sheet and sealant materials for controlling vapor diffusion at roof deck.
- B. Performance Requirements
 - 1. Materials of this Section shall provide continuity of vapor at building enclosure elements, in conjunction with air barrier materials in Division 07.
- C. Related Sections:
 - 1. Division 01 Section "Quality Requirements" for special building envelope mock-up.
 - 2. Division 05 Section "Cold Formed Metal Framing" requirements.
 - 3. Division 07 Section "Weather Barrier" for building envelope coordination.
 - 4. Division 07 Sections "Blanket and Board Insulation" for thermal insulation.
 - 5. Division 07 Sections "Roofing" for roof vapor retarder coordination.
 - 6. Division 09 Section "Non-Structural Metal Framing" for requirements.
 - 7. Division 09 Section "Gypsum Board" for installation in metal-framed assemblies.

1.2 REFERENCES

- A. Comply with all References in effect, most active, or latest version as of the date of the Contract Documents.
- B. ASTM International (ASTM):
 - 1. D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - 2. D1709 - Standard Test Method for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - 3. D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
 - 4. E96 - Standard Test Method for Water Vapor Transmission of Materials.
 - 5. E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
 - 6. E1249 - Standard Practice for Minimizing Dosimetry Errors in Radiation Hardness Testing of Silicon Electronic Devices Using Co-60 Sources.
 - 7. E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - 8. E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
- C. 2012 International Building Code. (2012 IBC).

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Include product description and performance characteristics.
 - 2. Samples: 12 by 12 inch vapor retarder samples.
 - 3. Independent laboratory test results showing compliance with ASTM standards.
 - 4. All mandatory ASTM testing must be performed on a single product roll.
 - 5. Manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

- A. Permeance of less than 0.01 perms per ASTM E96 or ASTM E1249 as tested in accordance with mandatory conditioning tests per ASTM E1745.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Wall, Roof and Floor Vapor Retarder Manufacturers:
 - 1. Reinforced -Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than **25 lb/1000 sq. ft.** with maximum permeance rating of **0.0507 perm.**
 - a. Available Products
 - 1. Raven Industries Inc.; DURA-SKRIM 6WW.
 - 2. Reef Industries, Inc.; Griffolyn T-65.
 - 3. Exceed requirements of ASTM D4397 and E154.
 - b. Substitutions: Under provisions of Division 01.

2.2 ACCESSORIES

- A. Adhesive:
 - 1. Compatible with vapor retarder and substrate, permanently non hardening.
- B. Joint Tape:
 - 1. Minimum 3 inches wide, pressure sensitive, waterproof, and documented compatible with vapor retarder.
 - 2. Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- C. Vapor Proofing Mastic:
 - 1. Waterproof and documented compatible with vapor retarder.
- D. Perimeter Seal Accessories.
 - 1. Tack tape and termination bar documented compatible with vapor retarder.
 - 2. Single- Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.

PART 3 - EXECUTION

3.1 INSTALLATION – WALLS, ROOF AND FLOOR

- A. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Provide complete and continuous vapor retarder at exterior walls except where interrupted by glazing or other openings.
- C. Locate wall vapor retarder on interior side of wall framing and insulation.
- D. Install vapor retarder on metal roof deck under insulation.
- E. Install wood floor vapor retarder in two (2) layers.
- F. Apply adhesive to substrate in accordance with Manufacturer's instructions for application and coverage.
- G. Install vapor retarder without tears, voids, and holes.
- H. Lap ends and edges minimum 4 inches over adjacent sheets. Seal laps with tape.
- I. Extend vapor retarder to full perimeter of adjacent door frames, window frames, openings, and to utility and other penetrations interrupting plane of membrane.
- J. Tape seal lapped joints, tears, holes, perimeter, and penetrations through vapor retarder. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
- K. Before installing vapor retarder, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
- L. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

3.2 REPAIR

- A. Inspect vapor retarder for damage just prior to covering.
- B. Clean damaged areas and cover with additional vapor retarder material cut minimum 6 inches larger than damaged area on all sides. Seal to main vapor retarder with continuous tape.

END OF SECTION 07 26 00

SECTION 07 27 00 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Fluid-applied membrane of synthetic polymer, fire retardant composition for use as an air, water and vapor barrier in exterior walls.
2. Monolithic, fully-adhered membrane and accessory products installed as a continuous air, water and vapor barrier assembly over substrates of the Project's opaque walls as indicated on Drawings
3. Air, water and vapor barrier assembly providing air and water tight coverage over these conditions
 - a. Joints between building materials such as sheathing joints, mortar joints and dissimilar materials.
 - b. Joints around windows, curtain walls, louvers, door frames and other service openings
 - c. Junctions between walls and floors, between walls at building corners and between walls, roofs and ceilings.
 - d. Mechanical and electrical penetrations
 - e. Structural penetrations for canopies, decks, walkways and similar horizontal projections or junctions to the exterior walls
 - f. Fastener and hardware penetrations used to attach insulation, cladding, trim or other overburden
 - g. Termination at footing, roof deck and existing construction
 - h. Junction to air & water barrier in roof, below grade or other adjacent systems
4. Air, water and vapor barrier assembly providing air and water tight coverage while accommodating designed movement at expansion and control joints.
5. Air, water and vapor barrier assembly performing as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration.

1.2 RELATED SECTIONS

- A. Section 07 21 13 – Board Insulation
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal through-wall flashings
- C. Section 07 92 00 - Joint Sealants
- D. Section 08 41 13 – Aluminum-Framed Storefronts, Entries and Window Systems

1.3 PERFORMANCE REQUIREMENTS

- A. Provide an air barrier membrane system constructed to perform as a continuous air barrier, and as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration. Membrane system shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air sealant materials at such locations, changes in substrate, perimeter conditions and penetrations.
- B. Reference Division 01 Section "Quality Requirements" for special building envelope mock-up requirements.
- C. Installed product and accessories shall exhibit an air leakage rate, infiltration and exfiltration modes, measured after pressure cycling, not to exceed 0.2 L/s*m² at 75 Pa [0.040 CFM/ft² at 1.57 PSF] according to ASTM E 2357.
- D. Installed product and accessories shall be recommended by manufacturer for at least 180 days of outdoor exposure.
- E. Installed product and accessories shall have an upper service temperature limit of 180°F or higher.

- F. Manufacturer shall provide product and accessories which have a minimum installation temperature of 25°F or lower.
- G. Product shall be of fire-retardant, non-asphalt synthetic polymer composition.
- H. Product shall be minimum 0.040 inch (40 mils) dry thickness membrane. Dry membrane thickness shall be calculated based on field-measured wet mil thickness using a comb gauge and volume % solids of the product. (Example 50% solids membrane applied at minimum 80 wet mils yields a minimum 40 mil thickness membrane)
- I. Product shall meet the following requirements:

| REQUIREMENT | RESULT | TEST METHOD |
|--|---|---|
| Air Permeance – on Porous Substrate | Not more than 0.02 L/s*m ² at 75 Pa (0.004 CFM/ft ² at 1.57 PSF) | ASTM E-2178, mod sprayed on CMU |
| Air Permeance – Free Film | Not more than 0.02 L/s*m ² at 75 Pa (0.004 CFM/ft ² at 1.57 PSF) | ASTM E-2178 |
| Low Temperature Flexibility | No cracking at minus 20 degrees F, 180 degree bend over 1 inch mandrel | ASTM D 1970 |
| Low-Temperature Crack Bridging | No cracking after 10 cycles at minus 15 deg F | ASTM C 1305, mod 40 mil membrane thickness |
| Long-Term Aging/ Flexibility | No cracking or tearing after aging | ASTM C 1522, mod 40 mil membrane thickness OR CGSB 71-GP-24M |
| Fastener Sealability | No water leaking through nail penetration after 24 h. | ASTM D 1970 |
| Water Resistance | Product spray-applied to CMU and gypsum sheathing with joint shall resist a 55 cm (22 inch) column of water for 5 hours, no leaking or wet through. | AATCC-127 - mod, static head generated with 5" diameter PVC pipe sealed to specimen |
| Pull Adhesion | Not less than 16 lb _f per square inch (or report value at substrate failure) on glass-faced gypsum sheathing and concrete masonry unit (CMU) | ASTM D 4541, modified 4 inch wood puck |
| Water Vapor Permeance | Not more than 1 Perm | ASTM E-96, Water Method (B) |
| Surface Burning Characteristics. | Flame Spread Index: Not more than 25 Smoke Generation Index: Not more than 450 | ASTM E 84, sample tested at full coverage, 40 mil dry film, cement board substrate |
| Measurement of Heat Release Rate by Cone Calorimeter | Effective Heat of Combustion: Not more than 8.2 MJ/kg Total Heat Released: not more than 12.9 MJ/m ² Peak Heat Release: Not more than 195 kW/m ² | ASTM E 1354, horizontal orientation, 50 kW/m ² heat flux |

1.4 REFERENCES

- A. American Association of Textile Chemists and Colorists (AATCC) Test Method 127. "Water Resistance – Hydrostatic Pressure Test"

- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2010 "Energy Standard for Buildings Except Low-Rise Residential Buildings"
- C. ASTM C 920 Standard Specification for Elastomeric Joint Sealants
- D. ASTM C 1305 Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane
- E. ASTM C 1522 Standard Test Method for Extensibility after Heat Aging of Cold, Liquid-Applied Elastomeric Waterproofing Membrane
- F. ASTM D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep slope roofing Underlayment for Ice Dam Protection.
- G. ASTM D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- H. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
- I. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.
- J. ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
- K. ASTM E 1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference
- L. ASTM E 1354 Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
- M. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials
- N. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- O. Canadian General Standards Board (CGSB) 71-GP-24M Standard for: Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation
- P. National Fire Protection Association (NFPA) 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.5 SUBMITTALS

- A. Provide submittals in accordance with Section 01 33 00
- B. At bid submission, provide evidence to the Architect of installer qualification by the air barrier manufacturer.
- C. Shop drawings showing locations and extent of air barrier and details of all typical conditions.
- D. Vertical and lateral fire propagation evaluation of the Project's exterior wall assemblies containing the product, submit documentation of one of the following:
 - 1. NFPA 285 test and pass
 - 2. NFPA 285 pass through engineering judgement
 - 3. Exemption from the NFPA 285 requirement.
- E. Manufacturer's technical data sheets and safety data sheets for product and accessories.
- F. Manufacturer's installation instructions.
- G. Certification of compatibility by manufacturer, listing all materials on the project with which the product and accessories may come into contact.
- H. Free film sample of product at representative cured thickness, minimum 2 inch by 3 inch size.
- I. Sample of sheet detail flashing and transition membrane, minimum 2 inch by 3 inch size.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.
- B. Single-Source Responsibility: Obtain product and accessories from single manufacturer.
- C. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

- D. Comply with the provisions of the Owner's building envelope commissioning program in accordance with Section 01 91 13
 - E. Pre-Installation Meeting: Convene one week prior to commencing Work of this Section.
 - F. Field-Constructed Mock-Ups: Prior to installation on Project, apply product and accessories on mock-up to verify details under shop drawing submittals, to demonstrate tie-ins with adjoining construction and other termination conditions and to become familiar with properties of materials in application:
 - 1. Apply in field-constructed mockups of assemblies as specified in Section 01 40 00 – Quality Requirements
 - G. Allow full cure of product and test mock-up in accordance with ASTM E 783 and ASTM E1105 for air and water infiltration
 - H. Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed product unless it has been inspected, tested and approved.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number and directions for storage.
 - B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by manufacturer.
 - C. During cold weather, protect product in containers and spray equipment from freezing. Maintain product temperature within acceptable range for spray application, as required by air barrier manufacturer.
 - D. Avoid spillage. Immediately notify Owner, and Architect if spillage occurs and start clean up procedures. Clean spills and leave area as it was prior to spill.
- 1.8 PROJECT / SITE CONDITIONS
- A. Do not apply product or accessories during rain or accumulating snowfall.
 - B. Apply product and accessories within approved ambient and substrate temperature range stated in manufacturer's literature.
 - C. Do not apply product or accessories over incompatible materials.
 - D. Observe safety and environmental measures indicated in manufacturer's SDS, and mandated by federal, state and local regulations.
- 1.9 WARRANTY
- A. Provide manufacturer's minimum 5-year material warranty for air barrier membrane materials, sealant and flashing membrane.

PART 2 - PRODUCTS

- 2.1 PRODUCTS AND MANUFACTURERS
- A. Basis-of-Design: Carlisle Coatings & Waterproofing, Incorporated. 900 Hensley Lane, Wylie, TX 75098. Phone 1-800-527-7092. Website <http://www.carlisleccw.com>
 - 1. Fire Resist Barritech NP, for installation at 40 degrees F and above
 - 2. Fire Resist Barritech NP LT, for installation at 25 degrees F and above
 - B. Substitutions: Under provisions of Division 1
- 2.2 ACCESSORIES: Provide from same manufacturer as air barrier membrane.
- A. Sheet Detail Flashing: Foil composite faced rubberized asphalt flashing, minimum 0.040 inch (40 mils) thickness.
 - 1. Fire-Resist 705 FR-A or Fire-Resist 705 FR-A LT low temperature application formula by Carlisle Coatings & Waterproofing, Incorporated
 - 2. Others as approved by air barrier membrane manufacturer
 - B. Contact Adhesive:

1. Carlisle Coatings & Waterproofing, Incorporated: CCW-702 Solvent-Based, CCW-702 LV VOC Compliant Solvent-Based, CCW-702 WB Water-Based, CAV-GRIP™ Aerosol Spray or Travel-Tack portable aerosol spray cans
2. Others as approved by air barrier membrane manufacturer
- C. Liquid Detail Flashing. Silane-terminated polyether, minimum 90% solids. ASTM C 920 Type S, Grade NS, Class 25, Use NT. 0.040 inch (40 mil) thickness application
 1. Barribond
 2. Others as approved by air barrier membrane manufacture
- D. Detail Sealant:
 1. Barribond by Carlisle Coatings & Waterproofing, Incorporated
 2. Others as approved by air barrier membrane manufacturer
- E. Transition Membrane:
 1. CCW SURE-SEAL Pressure-Sensitive Elastoform by Carlisle Coatings & Waterproofing, Incorporated
 2. Others as approved by air barrier membrane manufacturer
- F. Transition Membrane Primer:
 1. Carlisle Coatings & Waterproofing, Incorporated: SURE-SEAL HP-250 Primer, SURE-SEAL EP-95 Splicing Cement or SURE-SEAL Low VOC EPDM Primer
 2. Others as approved by air barrier membrane manufacturer
- G. Reinforcing Fabric: Woven, synthetic polymer fabric
 1. DCH Reinforcing Fabric by Carlisle Coatings & Waterproofing, Incorporated
 2. Others as approved by air barrier membrane manufacturer
- H. Glass Mat: Randomly-oriented glass strands held in binder soluble in wet air barrier membrane. Offered in rolls of various widths
 1. LiquiFiber
 2. Others as approved by air barrier membrane manufacturer
- I. Fill Compound: 2-part, non-sag polyurethane sealant
 1. Carlisle Coatings & Waterproofing, Incorporated: CCW-703 V or CCW-201
 2. Others as approved by air barrier membrane manufacturer

2.3 RELATED MATERIALS BY OTHERS

- A. Silicone Sealant, select any:
 1. Dow 758, 790, 791, 795
 2. Pecora AVB Silicone, 890, 891, 895
 3. GE Silpruf, Silpruf LM
 4. Other product approved by air barrier membrane manufacturer
- B. Polyurethane Foam Sealant, select any:
 1. TVM Fireblock Foam
 2. Fomo Handifoam Fireblock
 3. Great Stuff PRO or Froth Pack by Dow Chemical Company
 4. Other product approved by air barrier membrane manufacturer
- C. Insulation Adhesive, select any
 1. Barribond
 2. LM 800 XL
 3. QB-300 Multi-Purpose Construction Adhesive by OSI
 4. PL-300 VOC Foamboard Adhesive by Loctite
 5. Other product approved by air barrier membrane and board foam insulation manufacturer

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions affecting installation of the air & vapor barrier and accessory products for compliance with requirements. Verify that surfaces and

conditions are suitable prior to commencing Work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

- B. Verify that wall assemblies are dried in, such that water intrusion will not occur from above, behind or around the air barrier installation.
- C. Concrete shall be cured for a minimum of seven days. It shall be smooth, with sharp protrusions such as form joints or fins removed and ground flush. Honeycomb and holes/cracks shall be filled with grout or mortar.
- D. Surfaces shall be sound, dry and free of oil, grease, dirt, excess mortar or other contaminants.
- E. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.
- F. Mortar joints shall be struck flush and shall be free of voids. Mortar droppings shall be removed from brick ties and all other surfaces accepting air barrier.
- G. Sheathing boards shall be flush at joints, with gaps between boards according to building code and sheathing manufacturer's requirements. Sheathing boards shall also be securely fastened to the structure with proper fastener type, technique and spacing according to building code and sheathing manufacturer's requirements. Sheathing boards shall be repaired or replaced if inspection reveals moisture damage, mechanical damage or if sheathing boards have exceeded the exposure duration or exposure conditions as required by the sheathing manufacturer.
- H. Plywood, OSB, lumber or pressure-treated wood moisture content, measured with a wood moisture meter in the core of the substrate, shall be below 20%.
- I. Inform Architect and Owner in writing of
 - 1. Unsatisfactory substrates
 - 2. Cracks in concrete and masonry.
 - 3. Gaps or obstructions such as steel beams, angles, plates and projections which cannot be spanned or covered by Product or Accessories.
 - 4. Anticipated problems applying product and accessories over substrate.

3.2 DETAILING

- A. Additional materials and installation are required at joints, transitions, openings, terminations, penetrations and similar surface irregularities. Perform detailing before or after product installation.
- B. Install product and accessories in details as directed in manufacturer's literature. Sheathing joints, use one of the following methods:
 - 1. 4 inch reinforcing fabric imbedded in product and centered over joint.
 - 2. 2" width liquid flashing centered over joint.
- C. Sheathing inside and outside corners. Flashing or reinforcement shall bear 3 inches minimum onto either side of angle change. Use any of the following methods:
 - 1. Sheet detail flashing
 - 2. Liquid detail flashing centered over angle change
 - 3. Reinforcing fabric centered over angle change and imbedded in product
 - 4. Glass mat centered over angle change and imbedded in product
- D. Window openings. Flashing or reinforcement shall bear onto wall 3 inches minimum and shall return into window opening according to Project drawings. Use any of the following materials:
 - 1. Sheet detail flashing
 - 2. Liquid detail flashing
 - 3. Glass mat imbedded in product
- E. Pipe or duct penetrations. Flashing or reinforcement shall bear onto wall 3 inches minimum and shall bear onto pipe or duct 3 inches, or according to Project drawings. Select any:
 - 1. Sheet detail flashing
 - 2. Liquid detail flashing
 - 3. Glass mat imbedded in product
- F. Expansion or deflection joints. Flashing shall bear 3 inches minimum onto either side of joint. Select any:

1. Sheet detail flashing bellows or expansion bulb
2. Transition membrane expansion bulb
- G. Interface of dissimilar substrates: Flashing or reinforcement shall bear 3 inches minimum onto either side of joint. Select any:
 1. Sheet detail flashing
 2. Liquid detail flashing
 3. Reinforcing fabric imbedded in product
 4. Glass mat imbedded in product
- H. Seal all terminations of sheet detail flashing with a 1 inch width X 0.040 inch (40 mils) thick ribbon of detail sealant, centered over termination.

3.3 INSTALLATION

- A. Apply product and accessories over opaque wall surfaces as indicated in Project drawings.
- B. Use the manufacturer's standard or low temperature formula product as required by the project conditions.
- C. Apply product by spray, roller, brush or other method as recommended by air barrier manufacturer. Apply product at specified wet mil thickness in accordance with air barrier manufacturer's requirements.
- D. Verify compliance with air barrier manufacturer's minimum required wet mil thickness by documenting product use per area. Perform and document wet mil thickness measurements every 100 square feet, or more frequently if required, to establish uniform and adequate coverage.
- E. Installation shall produce complete coverage of opaque substrates as indicated in Drawings.
- F. Product and accessories shall be fully-adhered to substrates. Defects such as holes, fishmouths, blistering, de-lamination, bridging or thin spots shall be repaired according to air barrier manufacturer's instructions.

3.4 SCHEDULE

- A. Wall substrates and roof or temporary roof shall be in place, effectively enclosing interior space, before proceeding with air barrier installation.
- B. Seal penetrations made through installed product according to manufacturer's instructions and drawings.
- C. Seal fenestration to product with detail membrane, transition membrane, detail sealant, silicone sealant or polyurethane foam sealant according to Project drawings
- D. Through-wall flashing may be installed before or after product. Seal termination of through-wall flashing to product according product manufacturer's instructions.
- E. Exterior cladding shall be installed after product.
- F. Rigid or semi-rigid insulation installed over product shall be attached with mechanical fastening, insulation adhesive or a combination of these techniques, according to insulation manufacturer and air barrier manufacturer's instructions.
- G. Sequence Work to enable air barrier continuity at wall-to-foundation, shelf angle, wall-to-roof, fenestration, different wall assemblies and other conditions as indicated in Project drawings.

3.5 REPAIR AND PROTECTION

- A. Protect from damage during application and remainder of construction period.
- B. Inspect and make necessary repairs before covering. Repair or replace damaged material according to manufacturer's literature.
- C. Product and accessories are not designed for permanent exposure. Cover with insulation or exterior cladding as soon as schedule allows.
- D. Outdoor exposure of installed product and accessories shall not exceed 180 days.

END OF SECTION 07 27 00

SECTION 07 42 13 – METAL WALL PANELS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ribbed metal wall panels (Press Box)
- B. Design Requirements
 - 1. System to accommodate, without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing.
 - 2. Accommodate positive drainage for moisture entering or condensation occurring within panel system, to exterior. Provide vented/punched furring channels at all rain screen wall assemblies.
- C. Related Sections:
 - 1. Division 01 Section "Quality Requirements" for special building envelope mock-up.
 - 2. Division 05 Section "Cold-Formed Metal Framing" for support framing, including girts, studs, and bracing
 - 3. Division 07 Section "Thermal Insulation" for continuous insulated wall sheathing.
 - 4. Division 07 Section "Air Barriers" for continuous air barrier systems
 - 5. Division 07 Section "Sheet Metal Flashing and Trim" for flashing and other sheet metal work that is not part of metal wall panel assemblies
 - 6. Division 07 - Joint Sealers
 - 7. Division 07 – Aluminum Framed Storefronts
 - 8. Division 09 – Gypsum Board Systems
 - 9. Division 09 – Non-Structural Metal Framing

1.2 REFERENCES

- A. American Society for Testing and Materials.
 - B117: Method of Salt Spray Testing.
 - D822: Practice for operating light and water exposure apparatus (carbon arc type) for testing paint.
 - D1735: Method for water for testing of organic coatings.
- B. Federal Test Method Standards (FSC 8010).
 - 141A/6152: Accelerated weathering (enclosed arc apparatus).
 - 141A/6160: Conducting exterior exposure tests of paints on metals.
- C. National Coil Coaters Association.
 - NCCA II-6: Test method for measurement of impact resistance of painted aluminum or steel.
 - NCCA II-12: Specification for determination of relative pencil hardness.
 - NCCA II-16: Test method for determination of film adhesion by "cross hatch" tape test after reverse impact.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, furring channels, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.
 - 1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Anchorage systems.

- C. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
 - 2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.
 - D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Wall Panels: **12 inches** long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
 - 2. Trim and Closures: **12 inches** long. Include fasteners and other exposed accessories.
 - 3. Accessories: **12-inch-** long Samples for each type of accessory.
 - E. Qualification Data: For Installer.
 - F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product. Test reports from certified lab on ASTM E-84
 - G. Maintenance Data: For metal wall panels to include in maintenance manuals.
- 1.4 QUALITY ASSURANCE
- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 - B. Source Limitations: Obtain each type of metal wall panel from single source from single manufacturer.
 - C. Fire-Resistance Ratings: Where indicated, provide metal wall panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
 - D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall panel, including soffit, as shown on Drawings, including insulation, supports, attachments, and accessories.
 - 2. Conduct water spray test of mockup of metal wall panel assembly, testing for water penetration according to AAMA 501.2.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - E. Preinstallation Conference:
 - 1. Meet with Owner, Architect, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels, including installers of doors, windows, and louvers.
 - 2. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
 - 3. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
 - 4. Review temporary protection requirements for metal wall panel assembly during and after installation.
 - 5. Review wall panel observation and repair procedures after metal wall panel installation.
- 1.5 DELIVERY, STORAGE AND HANDLING
- A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
 - B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
 - C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for

drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

- D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.
- E. Protect foam-plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.6 PROJECT / SITE CONDITIONS

- A. Field Measurements, verify that field measurements are as indicated on shop drawings.

1.7 EXTENDED WARRANTY

- A. Provide under provisions of Division 01
- B. Finish Warranty: Furnish panel manufacturer's written warranty covering failure of the factory applied exterior finish on metal wall panel within the warranty period of 20 years after the date of substantial completion of the project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Metal Panel System (reference drawings):
 - 1. See sub-sections below
- B. Substitutions: Under provisions of Division 01 60 00.

2.2 METAL WALL PANELS

- A. General: Provide factory-formed metal panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight or rain screen installation as specified.
- B. Ribbed Metal Wall Panels - Panel formed with overlapping panel edges and intermediate stiffening ribs symmetrically spaced between panel edges.
 - 1. Wall Panel System
 - a. Basis of Design: AEP Span, [Perception Collection PC20-12](#)
 - b. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process & prepainted by the coil-coating process to comply with ASTM A-792.
 - c. Wall Panel Coverage: 12 inches.
 - d. Rib Height: 7/8"
 - e. Wall Panels – 24 gauge, lengths vary
 - f. Panel Orientation – Run panels vertical. Refer to Exterior Elevations.
 - g. Profile: Ribbed Panel
 - h. Color: Kynar 500 finish, colors vary
 - i. End Closure: Manufacturer's standard neoprene closure at all locations where panel ribs are oriented vertically. Provide custom fabricated sheet metal closure at all locations where panel ribs are oriented horizontally. Water jet cut to follow profile of panel. Mechanically attach sheet metal closures to vertical J-metal trim with color matched rivets. Color of sheet metal closure shall match wall panel. Minimum sheet metal closure thickness of 24 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate surfaces to receive metal panel system and associated work and condition which work will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer.
- B. Verify that building framing members are ready to receive panel system.
- C. Beginning installation indicated acceptance of substrate conditions

3.2 PREPARATION

- A. Prepare substrate surfaces to insure proper and adequate installation in accordance with the contract document and approved shop drawings, or manufacturer's requirements.
- B. Field measure and verify dimensions as required.
- C. Protect adjacent areas or surfaces from damage as a result of the work in this section.

3.3 INSTALLATION

- A. Fasten panels to structural supports; erect panels plumb, level and true to intended plane.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/8 inch.
- C. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- D. Anchor panels securely in accordance with manufacturer's approved submission drawings.
- E. Conform to manufacturer's instructions for installation attachment systems.
- F. If panel is a rain screen assembly, installed vented or punched framing member for moisture migration and air movement at rear face of panel.
- G. Surfaces to receive panels shall be even, smooth, sound, clean and free from defects detrimental to panel installation. Needed correction of these surfaces shall be the responsibility of someone other than the panel manufacturer or the installer.
- H. Weatherseal all joints as required using methods and materials as recommended by the manufacturer. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.
- I. Locate joints over supports. End lap minimum 2 inches.
- J. Use concealed fasteners, clips, and cleats for wall panels and trims.
- K. In addition to complying with requirements in "Metal Roof Panel Installation, General" Article, install metal panels to comply with requirements in this article.
- L. Flash and seal panels with weather closures where metal panels meet walls, soffit and at perimeter of all openings.
- M. Metal Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fascia meet soffits, along lower panel edges, and at perimeter of all openings.

3.4 CLEANING

- A. Clean work under provisions of Division 01.
- B. Remove site cuttings from finish surfaces.
- C. Clean and wash pre-finished surfaces with mild soap and water, rinse with clean water.

END OF SECTION 07 42 13

SECTION 07 42 93 – METAL SOFFIT PANELS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preformed metal panel system for soffits, with related anchorage cleats, flashings, trim and accessory components.
 - 2. Perforated metal soffit panels.
- B. Design Requirements
 - 1. System to accommodate, without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing.
 - 2. Accommodate positive drainage for moisture entering or condensation occurring within panel system, to exterior.
- C. Related Sections:
 - 1. Division 01 Section "Quality Requirements" for special building envelope mock-up.
 - 2. Division 05 Section "Cold-Formed Metal Framing" for support framing, including girts, studs, and bracing
 - 3. Division 07 Section "Thermal Insulation" for continuous insulated wall sheathing.
 - 4. Division 07 Section "Air Barriers" for continuous air barrier systems
 - 5. Division 07 Section "Sheet Metal Flashing and Trim" for flashing and other sheet metal work that is not part of metal wall panel assemblies
 - 6. Division 07 - Joint Sealers
 - 7. Division 07 – Aluminum Framed Storefronts
 - 8. Division 09 – Gypsum Board Systems
 - 9. Division 09 – Non-Structural Metal Framing

1.2 REFERENCES

- A. American Society for Testing and Materials.
 - B117: Method of Salt Spray Testing.
 - D822: Practice for operating light and water exposure apparatus (carbon arc type) for testing paint.
 - D1735: Method for water for testing of organic coatings.
- B. Federal Test Method Standards (FSC 8010).
 - 141A/6152: Accelerated weathering (enclosed arc apparatus).
 - 141A/6160: Conducting exterior exposure tests of paints on metals.
- C. National Coil Coaters Association.
 - NCCA II-6: Test method for measurement of impact resistance of painted aluminum or steel.
 - NCCA II-12: Specification for determination of relative pencil hardness.
 - NCCA II-16: Test method for determination of film adhesion by "cross hatch" tape test after reverse impact.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.
 - 1. Accessories: Include details of the following items, at a scale of not less than **1-1/2 inches per 12 inches**:
 - a. Flashing and trim.

- b. Anchorage systems.
 - C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
 - 2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.
 - D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Soffit Panels: **12 inches** long by actual panel width. Include fasteners, closures, and other metal panel accessories.
 - 2. Trim and Closures: **12 inches** long. Include fasteners and other exposed accessories.
 - 3. Accessories: **12-inch-** long Samples for each type of accessory.
 - E. Qualification Data: For Installer.
 - F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product. Test reports from certified lab on ASTM E-84
 - G. Maintenance Data: For metal panels to include in maintenance manuals.
- 1.4 QUALITY ASSURANCE
- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 - B. Source Limitations: Obtain each type of metal soffit panel from single source from single manufacturer.
 - C. Fire-Resistance Ratings: Where indicated, provide metal panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
 - D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical soffit panel as shown on Drawings, including insulation, supports, attachments, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - E. Preinstallation Conference:
 - 1. Meet with Owner, Architect, soffit panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels, including installers of doors, windows, and louvers.
 - 2. Review methods and procedures related to installation, including manufacturer's written instructions.
 - 3. Review flashings, special siding details, penetrations, openings, and condition of other construction that will affect metal soffit panels.
 - 4. Review temporary protection requirements for assembly during and after installation.
- 1.5 DELIVERY, STORAGE AND HANDLING
- A. Deliver components, sheets, soffit panels, and other manufactured items so as not to be damaged or deformed. Package panels for protection during transportation and handling.
 - B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
 - C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal soffit panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
 - D. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.
- 1.6 PROJECT / SITE CONDITIONS
- A. Field Measurements, verify that field measurements are as indicated on shop drawings.
- 1.7 EXTENDED WARRANTY
- A. Provide under provisions of Division 01
- B. Finish Warranty: Furnish panel manufacturer's written warranty covering failure of the factory applied exterior finish on metal soffit panel within the warranty period of 20 years after the date of substantial completion of the project.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
- A. Metal Panel System (reference drawings):
1. See sub-sections below
- B. Substitutions: Under provisions of Division 01 60 00.
- 2.2 METAL SOFFIT PANELS
- A. General: Provide factory-formed metal panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight or rain screen installation as specified.
- B. Flush Profile Perforated Metal Soffit Panel – Fully perforated panels (full width and length hole punched perforation) formed with vertical panel edges; with flush joint between panels.
1. Basis of Product: AEP-Span – Prestige Series (Full 12" flat panel – fully perforated from edge to edge) or comparable product by one of the following:
 - a. CENTRIA Architectural Systems.
 - b. Fabral.
 - c. IMETCO.
 - d. MBCI.
 - e. Metal Sales Manufacturing Corporation
 2. Material: Zinc-coated (galvanized) steel sheet, 0.034-inch nominal thickness.
 - a. Exterior Finish: 2-coat fluoropolymer.
 - b. Color: Off-White. Final color to be selected from full standard color range.
 - c. Perforation: Staggered circle pattern, roughly 15% open area.
 3. Panel Style: Flat panel, no pencil rib.
 4. Panel Coverage: 12 inches
 5. Panel Height: 1-1/2 inch tall
 6. Sealant: Factory applied with interlocking joint.

PART 3 - EXECUTION

- 3.1 EXAMINATION
- A. Examine substrate surfaces to receive metal panel system and associated work and condition which work will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer.
- B. Verify that building framing members are ready to receive panel system.
- C. Beginning installation indicated acceptance of substrate conditions

3.2 PREPARATION

- A. Prepare substrate surfaces to insure proper and adequate installation in accordance with the contract document and approved shop drawings, or manufacturer's requirements.
- B. Field measure and verify dimensions as required.
- C. Protect adjacent areas or surfaces from damage as a result of the work in this section.

3.3 INSTALLATION

- A. Fasten panels to structural supports; erect panels plumb, level and true to intended plane.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/8 inch.
- C. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- D. Anchor panels securely in place in accordance with manufacturer's approved submission drawings.
- E. Conform to manufacturer's instructions for installation attachment systems.
- F. Surfaces to receive panels shall be even, smooth, sound, clean and free from defects detrimental to panel installation. Needed correction of these surfaces shall be the responsibility of someone other than the panel manufacturer or the installer.
- G. Weatherseal all joints as required using methods and materials as recommended by the manufacturer. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.
- H. Locate joints over supports. End lap minimum 2 inches.
- I. Use concealed fasteners, clips, and cleats for soffit panels and trims.
- J. In addition to complying with requirements in "Metal Roof Panel Installation, General" Article, install metal soffit panels to comply with requirements in this article.
- K. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
- L. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.
- M. Metal Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fascia meet soffits, along lower panel edges, and at perimeter of all openings.

3.4 CLEANING

- A. Clean work under provisions of Division 01.
- B. Remove site cuttings from finish surfaces.
- C. Clean and wash pre-finished surfaces with mild soap and water, rinse with clean water.

END OF SECTION 07 42 93

SECTION 07 54 00 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Mechanically fastened single-ply membrane roofing system (Thermoplastic polyolefin - TPO), including tapered insulation and cricket assembly, accessories, and flashings.
 - 2. Vapor retarder.
 - 3. Roof insulation.
 - 4. Walkways.
- C. **System Description**
 - 1. Thermoplastic sheet membrane roof assembly to conform to UL and IBC requirements for a Class C fire classification assembly.
 - 2. The work of this section shall include all necessary materials and installation to comply with the stated Building Code requirements. Should materials or methods beyond those specified herein be necessary for any manufacturer's system to comply with those stated requirements, the additional materials or methods shall be provided at no additional cost to the Project.
- C. Related Sections:
 - 1. Division 06 Section "Rough Carpentry" for wood fire treated nailers, curbs, and blocking
 - 2. Division 07 Section "Thermal Insulation" for insulation beneath the roof deck.
 - 3. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
 - 4. Division 07 Section "Manufactured Roof Expansion Joints" for proprietary manufactured roof expansion-joint assemblies.
 - 5. Division 07 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
 - 6. Division 22 Section "Storm Drainage Piping Specialties" for roof drains.

1.3 DEFINITIONS

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
 - 1. **Wind resistance per IBC 1504.1 and 1609.1.1 90 mph min. 3 second gust.**
- D. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals' markings.
 - 1. Fire/Windstorm Classification: Class 1A-90

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Not Used
- C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Roof plan showing orientation of steel roof deck and orientation of membrane roofing and fastening spacings and patterns for mechanically fastened membrane roofing.
 - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes:
 - 1. Sheet roofing, of color specified, including T-shaped side and end lap seam.
 - 2. Roof insulation.
 - 3. Walkway pads or rolls.
 - 4. Termination bars.
 - 5. Battens.
 - 6. Six insulation fasteners of each type, length, and finish.
 - 7. Six roof cover fasteners of each type, length, and finish.
- E. Qualification Data: For qualified Installer and manufacturer.
- F. Manufacturer Certificate: Signed by roofing manufacturer certifying that membrane roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of complying with performance requirements.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- H. Research/Evaluation Reports: For components of membrane roofing system, from ICC-ES.
- I. Field quality-control reports.
- J. Maintenance Data: For membrane roofing system to include in maintenance manuals.
- K. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is FM Approvals for membrane roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
- C. Source Limitations: Obtain components including: roof insulation, fasteners, adhesives, flashing, and sealants for membrane roofing system from same manufacturer as membrane roofing.
- D. Exterior Fire-Test Exposure: ASTM E 108, Class B; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- E. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- F. Pre-installation Roofing Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.

8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.9 WARRANTY

- A. Submit and provide under provisions of Division 01.
- B. A roofing membrane manufacturer's representative shall inspect the installation of the Roofing System upon completion when presented for system warranty consideration.
- C. Upon acceptance thorough inspection, the manufacturer and installer shall execute the special warranties of this section.
- D. Provide **(15) years Manufacturer** water tightness warranty for water penetration and integrity of seals from date of substantial completion, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Warranty includes: all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products.
- E. Provide **(3) years Installer's** extended warranty from date of substantial completion. Warranty includes: all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products.
- F. All warranties shall include coverage of materials and installation for repairs resulting from failure of roofing system to resist penetration of moisture and to resist 90 m.p.h. wind. Liability under the warranty is set at the original price paid by the Owner for purchase and installation of the roof system.
- G. The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the contractor under requirements of the Contract Documents.

PART 2 – PRODUCTS

2.1 SINGLE PLY MEMBRANE ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle SynTec Inc. Product: SureWeld (Basis of Design)
 - b. Firestone Product: Ultra-Play

1. Inform Architect (in advance of installation) if roof vapor retarder will not be installed by roofing sub-contractor and submit installer qualifications. Roofing sub-contractor must inspect and accept installation of vapor retarder if installed by others.

2.4 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, glass-fiber mat facer on both major surfaces. Install 8 inch thickness for **R-38 thermal value**.
- C. Expanded Polystyrene Board Insulation: ASTM C 578, Type VIII standard specification for Rigid Cellular Polystyrene Thermal Insulation. Install thickness to achieve **R-38 thermal value**.
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope as indicated on drawings.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.5 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

2.6 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway 30 inch wide rolls, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer. Reference drawings for walkway locations.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- D. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking," according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

3.3 VAPOR-RETARDER INSTALLATION

- A. Apply vapor retarder to substrate surface with adhesive in accordance with manufacturer's instructions.
- B. Extend vapor retarder under blocking to deck edge.

3.4 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
 - 1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 - 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- G. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- H. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 3. Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 4. Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- I. Loosely Laid Insulation: Loosely lay insulation units over substrate.
- J. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.5 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Not Used

3.6 MECHANICALLY FASTENED MEMBRANE ROOFING INSTALLATION

- A. Unroll and position membrane. Provide and secure both perimeter and field membrane sheets in accordance with the manufacturer's most current specifications and details.
- B. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- C. Secure the membrane with the required Carlisle Fasteners and Plates spaced a maximum of 12 inches on center depending on project conditions (centered over the pre-printed marks approximately 1-1/2 inches from the edge of the membrane sheet).
- D. Mechanically fasten membrane roofing securely at terminations, penetrations, and perimeters.
- E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- F. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's specifications.

- G. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- H. Spread sealant or mastic bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
- I. Install membrane roofing and auxiliary materials to tie in to adjacent membrane roofing to maintain weather-tightness of transition and to not void warranty for adjacent membrane roofing system.

3.6 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.7 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

ROOFING WARRANTY

WHEREAS _____

of (Address) _____

herein called the "Roofing Contractor", has performed roofing and associated ("work") on following project:

Owner: _____

Fran Rish Stadium Improvements
Richland, Washington

07 54 00 - 7
12/9/2021

Address: _____

Name and Type of Building: _____

Address: _____

Area of Work: _____ Date of Acceptance: _____

Warranty Period: Three (3) years Date of Expiration: _____

AND WHEREAS Roofing Contractor has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period.

NOW THEREFORE Roofing Contractor hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work, and as are necessary to maintain said work in watertight condition. In addition to making the work watertight, the Roofing Contractor shall remove and/or repair blisters, ridges, flashings, splits and other irregularities which in the opinion of the Roofing Manufacturer's technical representative do not conform to acceptable roofing practices and conditions. These repairs shall be made prior to expiration of the three (3) year Warranty Period and to the satisfaction of the Roofing Manufacturer's technical representative.

This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by: a) lightning, windstorm; b) fire; c) failure of roofing system substrate including cracking, settlement, excessive deflection, deterioration, and decomposition; d) faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work; and e) activity on roofing by others including construction contractors, maintenance personnel, other persons, and animals whether authorized or unauthorized by Owner.

When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Contractor, and until cost and expense thereof has been paid by Owner or by another responsible party so designated.

2. The Roofing Contractor is responsible for damage to work covered by this Warranty, but is not liable for consequential damages to building or building contents, resulting from leaks or faults or defects of work.

3. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Contractor, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void upon date of said alterations, but only to extent said alterations affect work covered by this Warranty. If Owner engages Roofing Contractor to perform said alterations, Warranty shall not become null and void, unless Roofing Contractor, prior to proceeding with said work, shall claim that said alterations would like damage or deteriorate work, thereby reasonably justifying a limitation or termination of this warranty.

4. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void upon date of said change, but only to extent said change affects work covered by this Warranty.

5. The Owner shall promptly notify Roofing Contractor of observed, known or suspected leaks, defect or deterioration, and shall afford reasonable opportunity for Roofing Contractor to inspect work, and to examine evidence of such leaks, defects or deterioration.

6. This Warranty is recognized to be the only Warranty of Roofing Contractor on said work, and is in addition to the Roofing Guarantee furnished by the Roofing Manufacturer, and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to him in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Contractor of responsibility for performance of original work in accordance with requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been dully executed this

_____ day of _____, 20____

Cosigned by General Contractor by:

(General Contractor)

(Roofing Contractor)

(Business Address)

(Business Address)

(Signature)

(Signature)

(Title)

(Title)

END OF SECTION 07 54 00

SECTION 07 61 13 – STANDING SEAM METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Pre-coated standing-seamed steel roofing system and associated flashings.
 2. Counterflashings for roof-mounted equipment.
 3. Field installed thermal insulation.
 4. Snow guard roof perimeter rails.
 5. Energy Performance: Provide roof panels with solar reflectance index not less than **29** when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
 6. Energy Performance: Provide roof panels that are listed on the U.S. Department of Energy's ENERGY STAR Roof Products Qualified Product List for steep-slope roof products
- ##### B. Related Sections include the following:
1. Division 06 Section Sheathing for roofing system substrate and anchoring calculations.
 2. Division 07 Section Roofing Insulation for insulation specified as part of roofing construction.
 3. Division 07 Section Vapor Retarders roofing underlayment.
 4. Division 07 Section Pre-formed Metal Siding and Soffit installation at eaves and fascia.
 5. Division 07 Section Sheet Metal Flashing and Trim coordination with roofing assembly.
 6. Division 07 Section Roof Accessories for roof equipment.

1.2 REFERENCES

- A. ASTM A 792 - Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process for Roofing and Siding.
- B. ASTM A 446 - Specification for Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- C. NAAMM - Metal Finish Handbook.
- D. NRCA (National Roofing Contractors Association) - Roofing Manual.
- E. SMACNA - Architectural Sheet Metal Manual. "Fourth Edition".

1.3 SUBMITTALS

- A. Submit shop drawings under provisions of Division 01.
- B. WSSP Submittals
 1. Product Test Reports for Credit S4.2: For roof panels, indicating that panels comply with solar reflectance index requirement
 2. Product Data for Credit M2.1: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content
 3. Submit certification that the products of this section are manufactured within a 500 mile radius of the project site. Product Data for Credit M2.5: for materials regionally manufactured and extracted.
- C. Indicate on shop drawings, material profile, jointing pattern, jointing details, fastening methods, sealants, underlayment, and installation details.
- D. Shop drawings are to be approved by manufacturer.
- E. Wind-Uplift Resistance: Submit engineering data, prepared by a licensed engineer, showing all conditions to meet a UL 90 rating. Reference Section Division 06 Sheathing and drawings.
- E. Hydrostaic-Head Resistance: Submit engineering data for no water penetration when tested according to ASTM E 2140.
- F. Fire Rating: Submit engineering data for Underwriters' Laboratories, Inc., (UL) Class A roofing material acceptable for use in an approved Class A fire rating per UL 790
- F. Qualification Data: For qualified installer.

- G. Provide engineering data, prepared by a licensed engineer, showing layout and spacing of snow guards.

1.4 QUALITY ASSURANCE

- A. Installer: Company specializing in sheet metal roof installations with three years documented experience.
- B. Perform work in accordance with NRCA Roofing Manual.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site, store and protect under provisions of Division 01.
- B. Stack preformed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials during storage which may cause discoloration or staining.

1.6 SPECIAL WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - Finish Warranty Period: 20 years from date of Substantial Completion
- B. Upon acceptance through on-site inspection, the manufacturer and installer shall execute the special warranties following this section. Refer to Roofing Warranty, following this specification section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of design AEP Span (BHP), Product Design Span hp (manufactured in Tacoma, Washington)
 - AEP Span (BHP) – Design Span hp
 - 2141 Milwaukee Way.
 - Tacoma, WA. 98421
 - Phone: 1-800-733-4933
- B. Subject to compliance with the requirements, including regional manufacturing, products that may provide equivalent products are:

| | |
|------------------------------------|----------------------------|
| Fabral | Metal Sales Manufacturing |
| 3449 Hempland Rd / P.O. Box 4608 | 7800 State Rd. 60 |
| Lancaster, Pennsylvania 17604-4608 | Sellersburg, Indiana 47172 |
| Phone: 1-800-477-2741 | Phone: 1-812-246-1935 |
| MBCI | Berridge Manufacturing |
| PO Box 16027 | 7100 212th St SW |
| Salt Lake City, UT 84116 | Edmonds, WA 98026 |
| Phone: 801-530-4975 | Phone: 1-800-645-5330 |

2.2 MATERIALS

- A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755
- B. Recycled Content: Provide steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than **25** percent.
- C. Roof Panel Coverage: 17 inches.

- D. Standing Seam: 1 3/4"
- E. Roofing Panels – 24 gauge

2.3 ACCESSORIES

- A. Fasteners: Galvanized steel with neoprene washers. Finish exposed fasteners same as flashing metal. Engineer fastener layout and spacing requirements with roof wood sheathing substrate as specified.
- B. Sealant: As recommended by manufacturer.
- C. Bedding Compound: As recommended by manufacturer.
- D. Reglets: Recessed type, pre-finished steel.
- E. Sub-framing and Blocking: As required by manufacturer.
- F. Ice Shield Membrane: Equal to Ice and Water Shield as manufactured by Grace Construction Products, 40 mil thickness. Provide beneath all metal panels.
- G. Flexible Pipe flashings; Neoprene type, as manufactured by Dek Tite or equivalent.
- H. Plate Washers: Provide minimum 3"x3" spacer/plate washer at each roof clip/anchor location to avoid crushing rigid insulation below.
- I. Flashing and Trim: Coordinate with Division 07 "Sheet Metal Flashing and Trim." Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.
- J. Gutters: Coordinate with Division 07 "Sheet Metal Flashing and Trim."
- K. Downspouts: Coordinate with Division 07 "Sheet Metal Flashing and Trim."
- L. Roof Curbs: Coordinate with Division 07 "Sheet Metal Flashing and Trim." Fabricated from same material as roof panels, minimum 0.048 inch thick; with bottom of skirt profiled to match roof panel profiles, and welded top box and integral full-length cricket. Fabricate curb subframing of minimum 0.0598-inch-thick, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads, of size and height indicated. Finish roof curbs to match metal roof panels.

2.4 FIELD-INSTALLED THERMAL INSULATION

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.
- B. Insulation
 - 1. Insulation:
 - a. Closed cell Polyisocyanurate board with fiber reinforced facers uniforming to FS-HH-I-1972/GEN with minimum aged R-Value listed per drawings, as required to satisfy Class C fire hazard classification. Minimum thickness: as required to provide listed R-Value over any occupied, heated spaces. Stagger overlapping rigid insulation seams.
 - b. Expanded Polystyrene Board Insulation: ASTM C 578, Type VIII standard specification for Rigid Cellular Polystyrene Thermal Insulation as required to satisfy Class C fire hazard classification. Minimum thickness: as required to provide listed R-Value over any occupied, heated spaces. Stagger overlapping rigid insulation seams.
 - 3 Tapered Insulation for crickets: Closed cell Polyisocyanurate board with fiber reinforced facers uniforming to FS-HH-I-1972/GEN with minimum aged R-Value listed per drawings, as required to satisfy Class B fire hazard classification. Taper as required to provide 1/2" per foot slope as finished in the field. Apply all tapered insulation between layers of required insulation.
 - 4 Separation Sheet: As required by manufacturer.
 - 5 Insulation or protection board must be accepted in writing by the membrane manufacturer. All insulations must be approved by their manufacturer for mechanically attached installations.
 - 6 Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes

where indicated for sloping to drain. Fabricate to slopes indicated. Fabricate all saddles, crickets, tapered edge strips, cants and other insulation shapes in polyisocyanurate to match board insulation.

C. Fasteners:

1. Corrosion resistant screw fastener as recommended by roof membrane manufacturer.
2. Factory Mutual Tested and Approved with three (3) inches coated disc for 1-90 rating, length required to penetrate metal deck one inch.

2.5 SNOW GUARD

A. General: Provide snow guard rail system to control snow migration.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alpine Snow Guards, S-5 with ColorGard
 - b. Snojax Inc.
 - c. Polar Blox
2. System Requirements:
 - a. Horizontal rail (8 feet in length) to match color of metal roof panels. Reference drawings for locations and spacing requirements.
 - b. Stainless steel mounting bracket and stainless steel set screws installed at every other standing seam rib (minimum). Brackets shall fasten (or clamp) to standing seam rib and not create any penetrations in the metal roof system. Aluminum mounting brackets are allowed.

2.6 FABRICATION

A. Shop Assembly

1. Form sections true to shape, accurate in size, square, and free from distortion or defects.
2. Fabricate cleats of same material as sheet, inter-lockable with sheet.
3. Fabricate starter strips of same material as sheet, continuous, inter-lockable with sheet.
4. Form pieces in longest practical lengths.
5. Hem exposed edges on underside 1/2 inch; miter and seam corners.
6. Form material with locking standing seams.

B. Shop Finishing

1. All roofing, flashings, curbs and accessories are to be pre-coated with Kynar 500 finish.
2. Color: As selected by Architect, from entire range of Kynar 500 finishes, color to be similar to Kynar 500/Duratech 5000 color: "Cool" Roof Color, confirm color selection prior to final material order. Refer to 090000 Material Legend Key for color.
3. Galvanized Steel: 0.022 inch thick – minimum 24 gauge continuous extruded.

C. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. End Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. End Seams for Other Than Aluminum: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect roof deck to verify deck or substrate is clean and smooth, free of depressions, waves, or projections, properly sloped to valley and eaves.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, and reglets are in place.
- C. Beginning of installation indicates acceptance of existing conditions.

3.2 PREPARATION

- A. Field measure site conditions prior to fabricating work.
- B. Install starter and edge strips, and cleats before starting installation.
- C. Install reglets true to lines and levels.
- D. Protect elements surrounding work of this Section from damage or disfigurement.

3.3 INSTALLATION

- A. Conform to drawings and shop drawings.
- B. Provide Ice Shield Membrane above all roof overhangs, and in 48" from face of building wall below. Provide additional ice shield membrane protection in all roof valleys for a distance 48" out from the centerline of the valley.
- D. Apply vapor retarder underlayment over entire roof deck, under thermal insulation board.
- E. Apply general underlayment (felt) over entire roof deck, including areas protected by ice shield membrane. Provide minimum 6" minimum end and side laps.
- E. Standing Seam Roofing
 - 1. Installation is to be in strict compliance with manufacturer's requirements and details to achieve the attached warranty.
 - 2. Any deviation from published manufacturer's installation must be approved in writing from the manufacturer's representative and received by Architect prior to work proceeding.
 - 3. All components of the roofing system are to be modified as required to accommodate insulation thickness.
- F. Snow Guards:
 - 1. Snow guards are to be installed in areas shown on drawings.
 - 2. Install as indicated on engineered shop drawings.
 - 3. Anchor to standing seam sheet metal roofing and do not damage or penetrate the primary roofing system as recommended by manufacturer.
- G. THERMAL INSULATION INSTALLATION
 - 1. Polyethylene Vapor Retarder: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Repair tears or punctures immediately before concealment by other work.
 - 2. Board Insulation: Extend insulation in thickness as indicated to cover entire roof, stagger seams. Comply with installation requirements of insulation and roofing systems manufacturers. Install 6 inch thickness (2 layers minimum) for **R-38 thermal value**.
 - a. Erect insulation and hold in place with furring members spaced 24 inches o.c. Securely attach narrow flanges of furring members to roof deck with screws spaced 24 inches o.c. Over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
 - b. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
 - c. As applicable, use adhesive to install and attach roof insulation to the indicated substrate
 - d. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.

3.4 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Division 01.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.
- C. A representative of the roofing manufacturer is to perform an on-site inspection of the completed system and certify, in writing, that the system has been installed per manufacturer's requirements and as required to achieve the attached warranty.
- D. Field inspection to be performed by SMACNA representative for standing seam roof assembly to be in accordance with the SMACNA Architectural Sheet Metal Manual.
- E. Contractor shall correct identified defects or irregularities.

3.5 CLEANING

- A. Under provisions of Division 01.
- B. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.
- C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION OF FINISHED WORK

- A. Under provisions of Division 01.
- B. Protect building surfaces against damage from roofing work.

ROOFING WARRANTY

WHEREAS _____

of (Address) _____

herein called the "Roofing Contractor", has performed roofing and associated ("work") on following project:

Owner: _____

Address: _____

Name and Type of Building: _____

Address: _____

Area of Work: _____ Date of Acceptance: _____

Warranty Period: Three (3) years Date of Expiration: _____

AND WHEREAS Roofing Contractor has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period.

NOW THEREFORE Roofing Contractor hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work, and as are necessary to maintain said work in watertight condition. In addition to making the work watertight, the Roofing Contractor shall remove and/or repair blisters, ridges, flashings, splits and other irregularities which in the opinion of the Roofing Manufacturer's technical representative do not conform to acceptable roofing practices and conditions. These repairs shall be made prior to expiration of the three (3) year Warranty Period and to the satisfaction of the Roofing Manufacturer's technical representative.

This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by: a) lightning, windstorm; b) fire; c) failure of roofing system substrate including cracking, settlement, excessive deflection, deterioration, and decomposition; d) faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work; and e) activity on roofing by others including construction contractors, maintenance personnel, other persons, and animals whether authorized or unauthorized by Owner.

When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Contractor, and until cost and expense thereof has been paid by Owner or by another responsible party so designated.

2. The Roofing Contractor is responsible for damage to work covered by this Warranty, but is not liable for consequential damages to building or building contents, resulting from leaks or faults or defects of work.

3. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Contractor, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void upon date of said alterations, but only to extent said alterations affect work covered by this Warranty. If Owner engages

Roofing Contractor to perform said alterations, Warranty shall not become null and void, unless Roofing Contractor, prior to proceeding with said work, shall claim that said alterations would like damage or deteriorate work, thereby reasonably justifying a limitation or termination of this warranty.

4. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void upon date of said change, but only to extent said change affects work covered by this Warranty.

5. The Owner shall promptly notify Roofing Contractor of observed, known or suspected leaks, defect or deterioration, and shall afford reasonable opportunity for Roofing Contractor to inspect work, and to examine evidence of such leaks, defects or deterioration.

6. This Warranty is recognized to be the only Warranty of Roofing Contractor on said work, and is in addition to the Roofing Guarantee furnished by the Roofing Manufacturer, and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to him in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Contractor of responsibility for performance of original work in accordance with requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been dully executed this

_____ day of _____, 20____

Cosigned by General Contractor by:

| | |
|-------------------------------|-------------------------------|
| _____ (General Contractor) | _____ (Roofing Contractor) |
| _____ (Business Address) | _____ (Business Address) |
| _____ (Signature) | _____ (Signature) |
| _____ (Title) | _____ (Title) |

END OF SECTION 07 61 13

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formed Products:

- a. Formed roof drainage and sheet metal fabrications.
- b. Formed sloped roof sheet metal fabrications.
- c. Formed wall sheet metal fabrications.
- d. Formed equipment support flashing.
- e. Formed sheet metal soffit enclosure.
- f. Pre-cast or pre-formed splash block assembly for roof to roof drainage conditions.

B. Related Sections:

1. Division 01 Section "Quality Requirements" for special building envelope mock-up.
2. Division 05 Section "Metal Fabrications" for gutter support brackets
3. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
4. Division 07 Section "Roofing" for installing sheet metal flashing and trim integral with membrane roofing.
5. Division 07 Section "Metal Siding and Soffit" for sheet metal flashing and trim integral with metal wall panels.
6. Division 07 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
7. Division 07 Section "Joint Sealants" for sealants applied at metal flashing.
8. Division 07 Section "Composite Trim" for sheet metal flashing and trim requirements.
9. Division 08 Section "Aluminum-Framed Storefronts" for sheet metal flashing and trim integral with the storefront system.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 1. Identification of material, thickness, weight, and finish for each item and location in Project.
 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 4. Details of termination points and assemblies, including fixed points.
 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.

7. Details of special conditions.
 8. Details of connections to adjoining work.
 9. Detail formed flashing and trim at a scale of not less than **1-1/2 inches per 12 inches**.
 - C. Samples: For each type of exposed finish required, prepared on Samples of size indicated below:
 1. Sheet Metal Flashing: **12 inches** long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: **12 inches** long and in required profile. Include fasteners and other exposed accessories.
 3. Accessories and Miscellaneous Materials: Full-size Sample.
 - D. Qualification Data: For qualified fabricator.
 - E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.
 - F. Warranty: Sample of special warranty.
- 1.4 QUALITY ASSURANCE
- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
 - C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Build mockup of typical roof eave, approximately **10 feet** long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - D. Preinstallation Conference: Conduct conference at Project site.
 1. Meet with Owner, Architect, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
 2. Review methods and procedures related to sheet metal flashing and trim.
 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
 5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 - B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.
- 1.6 WARRANTY
- A. Provide Owner with a warranty stating that metal flashings and Associated sealants will properly shed water and protect building from physical damage for a minimum period of two years from date of substantial performance of work, as certified by Architect/Engineer, and that damage

resulting from failure to provide above stated performances will be repaired to satisfaction of Owner at no additional cost

- B. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, **G90** coating designation; structural quality.
 - 2. Surface: Smooth, flat.
 - 3. Exposed Coil-Coated Finish:
 - a. Two-coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4. Color: Shall be approved by Architect and match adjacent material being flashing.
 - 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil**.

2.2 ADDITIONAL UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Slip Sheet: Building paper, **3-lb/100 sq. ft.** minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:
 - 1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

2. For Zinc: ASTM B 32, 40 percent tin and 60 percent lead with low antimony, as recommended by manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch** wide and **1/8 inch** thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. **Pre-cast concrete or pre-formed fiberglass splash blocks – provide at all locations where roof scupper drainage discharges onto a lower level roof.**
 1. **Basis of Design: Modern Pre-Cast, 30 inch splash block – gray.**
 2. **Quantity: Provide (2) Units. Reference drawings for locations.**
 3. **Product substitution for equivalent under 01 60 00.**
- I. **Expanded Perlite Edge Strip: Preformed perlite tapered edge strip for top of parapet wall application. Provide sloped top for water drainage as shown in drawings.**
 1. **Basis of Design: Johns Manville, Tapered Fesco Edge Strip.**
 2. **Product substitution for equivalent under 01 60 00.**

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cheney Flashing Company.
 - b. Fry Reglet Corporation.
 - c. Heckmann Building Products Inc.
 - d. Hickman, W. P. Company.
 - e. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 - f. Keystone Flashing Company, Inc.
 - g. National Sheet Metal Systems, Inc.
 - h. Sandell Manufacturing Company, Inc.
 2. Material: Galvanized steel, **0.022 inch** thick.
 3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 4. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 6. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
 7. Finish: With manufacturer's standard color coating.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry,

metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of **1/4 inch in 20 feet** on slope and location lines as indicated and within **1/8-inch** offset of adjoining faces and of alignment of matching profiles.
- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than **1 inch** deep, filled with butyl sealant concealed within joints.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- I. Do not use graphite pencils to mark metal surfaces.
- 2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS
- A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum **96-inch**- long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
- B. Reference associated gutter support brackets under Division 05 "Metal Fabrications". Steel fabricated gutter supports are in addition to the concealed strap supports specified herein.
1. Gutter Style: reference drawings for profile and sizes. Comply with SMACNA requirements.
 2. Expansion Joints: Built in.
 3. Gutters with Girth up to **15 Inches**: Fabricate from the following materials:
 - a. Galvanized Steel: **0.022 inch** thick.
 - b. Concealed Gutter support straps: **0.022 inch** thick, 24" on center.
- C. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors. Lower portion of each downspout and custom down spouts at building perimeter shall be tube steel, 6'-0" in height. Reference drawings for locations and details.
1. Fabricated Hanger Style: reference drawings for profile and sizes. Comply with SMACNA requirements.
 2. Fabricate from the following materials:
 - a. Galvanized Steel: **18 gauge**.
 - b. Tube Steel: **1/8" thick square profile. Reference drawings for size.**

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof-Edge Flashing and Fascia Cap: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Furnish with 6-inch- wide, joint cover plates.
 - 1. Joint Style: Lap, 4 inches wide.
 - 2. Fabricate from the following materials:
 - a. Galvanized Steel: 0.028 inch thick.
- B. Copings: Fabricate in minimum 96-inch- (long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and[drill elongated holes for fasteners on] interior leg. Miter corners, seal, and solder or weld watertight.
 - 1. Coping Profile: reference drawings for profile and sizes. Comply with SMACNA requirements.
 - 2. Joint Style: Butt, with 12-inch- wide, concealed backup plate
 - 3. Fabricate from the following materials:
 - a. Galvanized Steel: 0.040 inch thick.
- C. Roof and Roof to Wall Transition, Roof to Roof Edge Flashing Transition and Fascia Cap Transition Expansion-Joint Cover: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.034 inch thick.
- D. Base Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch thick.
- E. Counterflashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.022 inch thick.
- F. Flashing Receivers: Fabricate from the following materials:
 - 1. Galvanized Steel: .022 inch thick.
- G. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch thick.
- H. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch thick.

2.8 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2-inch- high, end dams where flashing is discontinuous. Fabricate from the following materials:
 - 1. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
- C. Wall Expansion-Joint Cover: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch thick.

2.9 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings.
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than **6 inches** staggered **24 inches** between courses. Overlap side edges not less than **3-1/2 inches**. Roll laps with roller. Cover underlayment within 14 days. Coordinate work with other roofing trades.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than **12 inches** apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
 - 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. Coat back side of steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet** with no joints allowed within **24 inches** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than **1 inch** deep, filled with sealant concealed within joints.
- D. Beam End Cap: provide Kynar Finish sheet cap with drip edge at all exposed end grain glu-lam beam locations. Coordinate finish color and fastener details with Architect.
- E. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- F. Seal joints as shown and as required for watertight construction.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than **1 inch** into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between **40 and 70 deg F**, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below **40 deg F**.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of **1-1/2 inches**, except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Pre-tinning is not required for zinc-tin alloy-coated stainless steel.
2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.4 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Set gutters in gutter support brackets (reference Division 05 "Metal Fabrications") aligned at every-other standing metal roof seam. Attach gutters at eave or fascia to firmly anchored concealed straps spaced not more than **24 inches** apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 1. Fasten gutter spacers to front and back of gutter.
 2. Loosely lock straps to front gutter bead and anchor to roof deck.
 3. Anchor and loosely lock back edge of gutter to continuous cleat.
 4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than **24 inches** apart.
 5. Install gutter with expansion joints at locations indicated, but not exceeding, **50 feet** apart. Install expansion-joint caps.
- C. Downspouts: Join sections with **1-1/2-inch** telescoping joints.
 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately **48 inches** o.c. in between.
 2. Connect downspouts to underground drainage system indicated with base boot connection to tightline.
- D. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
 1. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
 2. Loosely lock front edge of scupper with conductor head.
- E. Conductor Heads: Anchor securely to wall with elevation of conductor head rim **1 inch** below scupper discharge.
- F. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of **4 inches** in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered **3-inch** centers.
- C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at **24-inch** centers.
- D. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at **24-inch** centers.
 2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at **24-inch** centers.
- E. Insert metal flashings into reglets to form tight fit. Secure in place with plastic wedges at maximum 12 inches on center. Seal flashing into reglets with sealant

- F. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
 - G. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of anchor and washer at 36-inch centers.
 - H. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.
 - I. Counterflash mechanical and electrical items projecting through roofing
 - J. Provide colored sheetmetal sleeves over mechanical and electrical items projecting through the roof.
- 3.6 WALL FLASHING INSTALLATION
- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
 - B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section "Unit Masonry."
 - C. Reglets: Installation of reglets as indicated."
 - D. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings.
- 3.7 MISCELLANEOUS FLASHING INSTALLATION
- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- 3.8 ERECTION TOLERANCES
- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- 3.9 CLEANING AND PROTECTION
- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
 - B. Clean and neutralize flux materials. Clean off excess solder.
 - C. Clean off excess sealants.
 - D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
 - E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 62 00

SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Roof hatches.
- B. Related Sections include the following:
 - 1. Division 05 Section "Metal Fabrications" for metal vertical ladders, for access to roof hatches.
 - 2. Division 06 Section "Rough Carpentry" for wood cants, and wood nailers.
 - 3. Division 07 low-slope roofing Sections for roofing accessories.
 - 4. Division 07 Section "Sheet Metal Flashing and Trim" for shop- and field-fabricated metal flashing and counterflashing, and miscellaneous sheet metal trim and accessories.

1.2 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.
- C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
 - 1. Size and location of roof accessories specified in this Section.
 - 2. Method of attaching roof accessories to roof or building structure.
 - 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
- D. Samples: For each type of exposed factory-applied finish required and for each type of roof accessory indicated, prepared on Samples of size to adequately show color.
- E. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

- A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

1.7 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by hot-dip process and prepainted by coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Galvanized Steel Sheet: ASTM A 653, G90 coated.
 - 2. Exposed Finishes: High-Performance Organic Finish (2-Coat Fluoropolymer): Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 - a. Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements in AAMA 2604, except as modified below:
 - 1) Humidity Resistance: 1000 hours.
 - 2) Salt-Spray Resistance: 1000 hours.
- B. Stainless-Steel Shapes or Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304 or Type 316, No. 2D finish.
- C. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized to comply with ASTM A 123/A 123M, unless otherwise indicated.
- D. Steel Tube: ASTM A 500, round tube, baked-enamel finished.
- E. Galvanized Steel Tube: ASTM A 500, round tube, hot-dip galvanized to comply with ASTM A 123/A 123M.
- F. Galvanized Steel Pipe: ASTM A 53/A 53M.

2.2 MISCELLANEOUS MATERIALS

- A. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, 1 inch thick.
- B. Glass-Fiber Board Insulation: ASTM C 726, 1 inch thick.
- C. Polyisocyanurate Board Insulation: ASTM C 1289, 1 inch thick.
- D. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for above ground use, complying with AWPA C2; not less than 1-1/2 inches thick.
- E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- F. Polyethylene Sheet: 6-mil- thick, polyethylene sheet complying with ASTM D 4397.
- G. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 1. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft.
- H. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.
- I. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
- J. Elastomeric Sealant: ASTM C 920, silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- K. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, and heavy bodied for hooked-type expansion joints with limited movement.
- L. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

2.3 ROOF HATCHES

- A. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated double-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware.
1. Available Manufacturers:
 - a. Bilco Company – Basis of Design.
 - b. Babcock-Davis; a Ciera Products Inc. Company.
 - c. Custom Curb, Inc.
 - d. Milcor Inc.; a Gibraltar Company.
 - e. Precision Ladders, LLC.
 - f. Wasco Products, Inc.
 2. Loads: Fabricate roof hatches to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loads.
 3. Type and Size:
 - a. **Ticket Building:** Single-leaf lid, 30 by 36 inches. Verify hinge location for access per WISHA.
 - b. **Locker Room Building:** Type NB Roof Hatch – Ship Stair Access, 30" x 54" with Bil-Guard 2.0 Roof Hatch Safety Railing System RL2-NB.
 4. Curb and Lid Material: Galvanized steel sheet, 0.079 inch thick.
 5. Insulation: Polyisocyanurate board.
 6. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
 7. Exterior Curb Liner: Manufacturer's standard metal liner of same material and finish as metal curb.
 8. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
 9. Fabricate units to minimum height of **12 inches**, unless otherwise indicated.
 10. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate hatch curbs with height constant.
 11. Hardware: Stainless-steel spring latch with turn handles, pintle-type hinge system, and padlock hasps inside and outside.
 - a. Provide gasketing and equip with corrosion-resistant or hot-dip galvanized hardware including pintle hinges, hold-open devices, interior padlock hasps, and both interior and exterior latch handles.
 - b. Provide remote-control operation.
 - c. Verify hinge location for access per WISHA
 12. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.
 - a. Height: **42 inches** above finished roof deck.
 - b. Material and Finish: Steel tube, galvanized.
 - c. Diameter: Pipe with **1-5/8-inch** OD tube.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored and is ready to receive roof accessories.
 2. Verify dimensions of roof openings for roof accessories.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners,

separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.

- B. Install roof accessories to fit substrates and to result in watertight performance.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.
- D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
- E. Roof Curb Installation:
 - 1. Set roof curb so top surface of roof curb and hatch assembly is **parallel with roof slope**.
- F. Roof Hatch Installation:
 - 1. Check roof hatch for proper operation. Adjust operating mechanism as required. Clean and lubricate joints and hardware.
 - 2. Attach safety railing system to roof hatch curb.
 - 3. Attach ladder safety post according to manufacturer's written instructions.
- G. Seal joints with butyl sealant as required by manufacturer of roof accessories.

3.3 TOUCH UP

- A. Touch up factory-primed surfaces with compatible primer ready for field painting in accordance with Division 09 painting Sections.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.4 CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions.

END OF SECTION 07 72 00

SECTION 07 84 00 – FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. All individual trades shall provide and install all firestopping and smoke seal materials, assemblies, systems, and accessories at all penetrations of fire or smoke rated building elements or assemblies
- C. All firestopping in the project shall be installed in compliance with this section, firestopping shall be installed by the trade making the penetration using a single firestopping manufacturer's products
- D. Reference Drawings, including but not limited to the Code Summary Plan and typical assembly details for additional information regarding fire rating requirements.
- E. Comply with all local jurisdictional requirements.
- F. Related Sections include the following:
 - 1. Division 21 Sections specifying fire-suppression piping penetrations.
 - 2. Division 22 and 23 Sections specifying duct and piping penetrations.
 - 3. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.

1.2 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
 - 1. Fire-resistance-rated walls including fire walls, fire partitions, fire barriers, and smoke barriers.
 - 2. Fire-resistance-rated horizontal assemblies including floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:
 - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - 2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance-rated shaft enclosures.
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding **4 inches** in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 - 2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
 - 3. Document all fire penetration locations and provide to local inspector for use and approval during inspections. Comply with city and county regulations for documentation of penetration locations.
- C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
 - 1. Types of penetrating items.
 - 2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
 - 3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
- D. Provide submittal of all penetration firestopping information to local jurisdiction for review and comment prior to any on-site application.
- E. Product data confirming compliance with VOC limit requirements contained in section 01 81 14.
- F. Qualification Data: For Installer.
- G. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.
- H. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

1. UL in its "Fire Resistance Directory."
 - D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
 - B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- 1.6 PROJECT CONDITIONS
- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
 - B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
- 1.7 COORDINATION
- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
 - B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
 - C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
- A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated that are produced by one of the following manufacturers:
 1. A/D Fire Protection Systems Inc.
 2. Grace, W. R. & Co. - Conn.
 3. Hilti, Inc.
 4. Johns Manville.
 5. Nelson Firestop Products.
 6. NUCO Inc.
 7. RectorSeal Corporation (The).
 8. Specified Technologies Inc.
 9. 3M; Fire Protection Products Division.
 10. Tremco; Sealant/Weatherproofing Division.
 11. USG Corporation.
- 2.2 FIRESTOPPING, GENERAL
- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
 - B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and

approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fillers for sealants.
2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- D. Remove excess firestop material at all exposed conditions. Clean, brush and wash excess firestop material for clean appearance. Cover or conceal excess exposed material with stainless steel escutcheon as needed if cleaning is not satisfactory to Architect and Owner.

3.4 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner may engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

- C. Proceed with enclosing through-penetration firestop systems with other construction only after Owner agrees and/or inspection reports are issued and firestop installations comply with requirements.
- D. Contractor to comply with authorities having jurisdiction and work with inspectors as required to complete inspection and verification of each sealed penetration location. Provide all documentation as requested by inspector.

3.5 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.6 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestopping materials shall be free of asbestos and PCB's
- C. Materials, assemblies, products and accessories used shall be appropriate for the following parameters:
 - 1. Fire-rated Building Element or Assembly Penetrated:
 - a. Floor/ceiling, wall, roof, roof/ceiling.
 - 1. Rating: 1 hour, and 2 hour.
 - 2. Materials: masonry, concrete, gypsum wallboard, concrete, metal decking.
 - 3. Thickness as required or detailed
 - b. Item(s) Penetrating Fire-Rated Building Element or Assembly: pipe(s), conduit(s), Cable(s), etc.
 - 1. Material: steel, cast iron, copper, plastic, etc.
 - 2. Size: diameter, dimensions, thickness: e.g. '4" schedule 40 steel pipe, 4"x4" opening
 - 3. Insulation: material and thickness
 - c. Size of annulus between Item Penetrating and Building Element Penetrated
 - d. Include all Joints, voids, abandoned openings, and openings for future use

END OF SECTION 07 84 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes joint sealants for the following applications, including preparing sealant substrate surfaces, sealant and expandable backing. This work includes those installations specified by reference to this Section:
 - 1. Exterior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precast architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints in exterior insulation and finish systems.
 - e. Joints between metal panels.
 - f. Joints between different materials listed above.
 - g. Perimeter joints between materials listed above and frames of doors windows and louvers
 - h. Control and expansion joints in ceilings and other overhead surfaces.
 - i. Other joints as indicated.
 - 2. Exterior joints in the following horizontal traffic surfaces:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Vertical joints on exposed surfaces of partitions.
 - e. Perimeter joints between interior wall surfaces and frames of interior doors, and windows.
 - f. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - g. Other joints as indicated.
 - 4. Interior joints in the following horizontal traffic surfaces:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
- B. Related Sections include the following:
 - 1. Division 01 Section "Quality Requirements" for special building envelope mock-up.
 - 2. Division 04 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
 - 3. Division 07 Section "Composite Metal Wall Panels" for panel sealants
 - 4. Division 07 Section "Sheet Metal Flashing and Trim" for joint sealants
 - 5. Division 08 Section "Glazing" for glazing sealants.
 - 6. Division 09 Section "Gypsum Board" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
 - 7. Division 09 Section "Tiling" for sealing tile joints.
 - 8. Division 09 Section "Acoustical Panel Ceilings" and "Acoustical Tile Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.
 - 9. Division 32 Section "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.
- F. Qualification Data: For Installer.
- G. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- H. Field Test Report Log: For each elastomeric sealant application.
- I. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- J. Warranties: Special warranties specified in this Section.
- K. WSSP Compliance Submittals: Product Data for Credit IEQ 3.1: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- B. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - b. Each type of nonelastomeric sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.

- a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.
 - 1. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 4. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - 5. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
- 1.5 PROJECT CONDITIONS
 - A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
- 1.6 WARRANTY
 - A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
 - B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
 - C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Acoustical Sealant: 250 g/L
 - 2. Architectural Sealants: 250 g/L.
 - 3. Nonmembrane Roof Sealants: 300 g/L.
 - 4. Single-Ply Roof Membrane Sealants: 450 g/L.
 - 5. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 6. Sealant Primers for Porous Substrates: 775 g/L.
 - 7. Modified Bituminous Sealant Primers: 500 g/L.
- C. Colors of Exposed Joint Sealants: Integrally colored sealants, as selected by Architect to match adjacent materials.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Immersion in Liquids: Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600. Provide products and installations that comply with this requirement in Food Preparation and Food Serving Areas of the project.
- E. **Sealant Type #1: Single-Component Silicone Sealant:**
 - 1. Available Products:
 - a. Basis of Design: Dow Corning Corporation; 795
 - b. GE Silicones; SilPruf NB SCS9000.
 - c. GE Silicones; UltraPruf II SCS2900.
 - d. Pecora Corporation; 865.
 - e. Pecora Corporation; 895.
 - f. Pecora Corporation; 898.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 50.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: Coated glass, anodic aluminum, aluminum coated with a high-performance coating, galvanized steel.
 - 6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
- F. **Sealant Type #2: Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:**
 - 1. Available Products:
 - a. Basis of Design: Dow Corning Corporation; 786 Mildew Resistant.
 - b. GE Silicones; Sanitary SCS1700.
 - c. Tremco; Tremsil 200 [White] [Clear].
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: Coated glass, anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, ceramic tile.
- G. **Sealant Type #3: Multicomponent Nonsag Urethane Sealant:**
 - 1. Available Products:

- a. Basis of Design: Sonneborn, Division of ChemRex Inc.; NP 2.
 - b. Schnee-Morehead, Inc.; Permthane SM 7200.
 - c. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
 - d. Tremco; Vulkem 227.
- 2. Type and Grade: M (multicomponent) and NS (nonsag).
- 3. Class: 25.
- 4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
- H. **Sealant Type #4:** Single-Component Self Leveling Urethane Sealant:
 - 1. Available Products:
 - a. Basis of Design: ChemRex Sonneborn SL-1
 - b. Schnee-Morehead, Inc.; equivalent product to basis of design.
 - c. Sika Corporation, Inc.; equivalent product to basis of design.
 - d. Tremco; equivalent product to basis of design.
 - 2. Type and Grade: S (single component) and SL (self leveling).
 - 3. Class: 25.
 - 4. Use Related to Exposure: T (traffic).
- I. **Sealant Type #5:** Single-Component Nonsag Urethane Sealant:
 - 1. Available Products:
 - a. Basis of Design: ChemRex Sonneborn NP-1
 - b. Bostik Findley; Chem-Calk 900.
 - c. Pecora Corporation; Dynatrol I-XL.
 - d. Polymeric Systems Inc.; Flexiprene 1000.
 - e. Polymeric Systems Inc.; PSI-901.
 - f. Schnee-Morehead, Inc.; Permthane SM7100.
 - g. Sika Corporation, Inc.; Sikaflex - 15LM.
 - h. Tremco; DyMonic.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use Related to Exposure: NT (nontraffic).

2.4 LATEX JOINT SEALANTS

- A. **Sealant Type #6:** Latex Sealant: Comply with ASTM C 834, Type P, Grade NF, for field applied paint finish.
- B. Available Products:
 - 1. Bostik Findley; Chem-Calk 600.
 - 2. Pecora Corporation; AC-20+.
 - 3. Schnee-Morehead, Inc.; SM 8200.
 - 4. Sonneborn, Division of ChemRex Inc.; Sonolac.
 - 5. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

- A. **Sealant Type #7:** Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:
 - 1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 2. Available Products:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
 - 1. Available Products:
 - a. Pecora Corporation; BA-98.
 - b. Tremco; Tremco Acoustical Sealant.

2.6 PREFORMED TAPE SEALANTS

- A. Back-Bedding Mastic Tape Sealant: Preformed, butyl-based elastomeric tape sealant with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 807.3 tape, for applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Tape Sealant: Closed-cell, PVC foam tape sealant; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
 - 1. Type 1, for applications in which tape acts as the primary sealant.
 - 2. Type 2, for applications in which tape is used in combination with a full bead of liquid sealant.

2.7 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and

- approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.
1. Mask all locations where silicone based sealants are installed. No silicone based sealant shall be allowed to migrate onto adjacent finished surfaces.
- ### 3.3 INSTALLATION OF JOINT SEALANTS
- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
 - B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
 - C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
 - D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
 - E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
 - F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
 - G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
- H. Installation of Preformed Tapes: Install according to manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193, as appropriate for type of joint-sealant application indicated.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
 4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free of voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
 5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- B. Remove any and all sealant material outside of the joint area. Fully remove the sealant material to allow for a complete and satisfactory installation of other finishes including paint.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage

or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior butt joints between metal panels.
 - 1. Joint Sealant: Sealant Type #1 or as recommended by the metal wall panel manufacturer.
 - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- B. Joint-Sealant Application: Exterior perimeter joints at frames of doors, windows, and louvers.
 - 1. Joint Sealant: Sealant Type #1.
 - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- C. Joint-Sealant Application: Interior joints in High Moisture and Mildew Areas, between plumbing fixtures and adjoining walls, floors, and counters.
 - 1. Joint Sealant: Sealant Type #2.
 - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- D. Joint-Sealant Application: Exterior vertical and horizontal nontraffic construction joints in cast-in-place concrete.
 - 1. Joint Sealant: Sealant Type #3 or #5.
 - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- E. Joint-Sealant Application: Exterior horizontal traffic isolation and contraction joints in cast-in-place concrete slabs.
 - 1. Joint Sealant: Sealant Type #4.
 - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- F. Joint-Sealant Application: Exterior vertical and horizontal nontraffic joints between plant-precast architectural concrete units, exterior vertical control and expansion joints in unit masonry, exterior vertical joints between differing materials.
 - 1. Joint Sealant: Sealant Type #5.
 - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- G. Joint-Sealant Application: Interior perimeter joints of exterior openings, perimeter joints between interior ceiling surfaces, interior wall surfaces, trim components, and frames of interior doors, and windows, interior and exterior sealant-pointed mortar joints in glass unit masonry assemblies.
 - 1. Joint Sealant: Sealant Type #6.
 - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- H. Joint-Sealant Application: Acoustical perimeter joints between interior ceiling surfaces, interior wall surfaces and frames of interior doors, and windows. Install on all walls indicated to receive acoustical wall insulation (indicated by wall type reference in the drawings)
 - 1. Joint Sealant: Sealant Type #7.
 - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- I. Joint-Sealants used in food service areas of the building will be specifically approved by governing authorities for use in such locations.

END OF SECTION 07 92 00

DIVISION 08 – OPENINGS

| | | |
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| MARK | LOCATION | DOOR | | | | FRAME | | | DETAILS | | ASSEM RATING | HW GROUP | REMARKS |
|-------------|---------------------|------------------|------|------|--------|--------|----------|--------|----------|----------|-----------------|-------------|---|
| | | Size | Type | Matl | Finish | Type | Material | Finish | Head | Jamb | | | |
| GRANDSTANDS | | | | | | | | | | | | | |
| 101 | Vestibule 101 | 3'-0" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 1 | Insulated door, panic hardware, alum drip cap, weather strip |
| 101A | Coach Office 101A | 3'-0" x 7'-0" | NG | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 2 | Classroom lockset |
| 101B | RR 101B | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 3 | Privacy lockset, closer |
| 101C | Custodial 101C | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 4 | Classroom lockset |
| 101D | Storage 101D | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 2 | Classroom lockset |
| 101E | Storage 101E | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 2 | Classroom lockset |
| 101H | Locker Room 1A | PR 3'-0" x 7'-0" | F | MTL | PT | 02 | HM | PT | G9/A8.50 | G9/A8.50 | - | 5 | Panic Hardware, closer w/ hold open, no mullion, magnetic Hold Open device each door |
| 102 | Vestibule 102 | 3'-0" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 1 | Insulated door, panic hardware, alum drip cap, weather strip |
| 102A | Storage 102A | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 2 | Classroom lockset |
| 102D | Coach Office 101A | 3'-0" x 7'-0" | NG | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 2 | Classroom lockset |
| 103 | Training 103 | PR 3'-0" x 7'-0" | F | FRP | FF | 04 | HM | PT | C1/A8.41 | C3/A8.41 | - | 6 | Insulated door, panic hardware, alum drip cap, weather strip |
| 103A | Training 103A | PR 3'-0" x 7'-0" | F | FRP | FF | 02 | HM | PT | G9/A8.50 | G9/A8.50 | - | 7 | Lockset, no mullion, closer w/ hold open |
| 104 | Vestibule 104 | 3'-0" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 1 | Insulated door, panic hardware, alum drip cap, weather strip |
| 104A | Coach Office 104A | 3'-0" x 7'-0" | NG | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 2 | Classroom lockset |
| 104B | RR 104B | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 3 | Privacy lockset, closer |
| 104C | Custodial 104C | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 2 | Classroom lockset |
| 104F | Storage 104F | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 4 | Classroom lockset |
| 105 | Vestibule 105 | 3'-0" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 1 | Insulated door, panic hardware, alum drip cap, weather strip |
| 105A | Custodial 105A | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 2 | Classroom lockset |
| 105D | Locker Room 2B | PR 3'-0" x 7'-0" | F | MTL | PT | 02 | HM | PT | G9/A8.50 | G9/A8.50 | - | 5 | Panic Hardware, closer w/ hold open, no mullion, magnetic Hold Open device each door |
| 105E | Coach Office 104A | 3'-0" x 7'-0" | NG | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 5 | Classroom lockset |
| 106 | Field Storage 106 | 8'-0" x 10'-0" | OHD | S.S. | FF | - | S.S. | FF | - | - | - | 8 | Insulated door, Motor operated |
| 107A | Sales 107A | 8'-0" x 4'-0" | OCD | S.S. | FF | - | S.S. | FF | - | - | - | 8 | Insulated door, manual operation |
| 107B | Storage 107B | 3'-0" x 7'-0" | F | MTL | PT | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 9 | Insulated door, lockset, alum drip cap, weather strip |
| 108 | Mechancial 108 | 3'-0" x 7'-0" | F | MTL | PT | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 10 | Insulated door, lockset, alum drip cap, weather strip |
| 109 | Electrical/MDF 109 | 3'-0" x 7'-0" | F | MTL | PT | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 9 | Insulated door, lockset, alum drip cap, weather strip |
| 110 | Referee Women 110 | 3'-0" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 11 | Insulated door, lockset, closer, alum drip cap, weather strip |
| 111 | Referee Men 111 | 3'-0" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 11 | Insulated door, lockset, closer, alum drip cap, weather strip |
| 111A | Referee Men 111 | 8'-0"x9'-0" | OHD | ALUM | FF | - | ALUM | FF | - | - | - | 8 | Keyed lockset by manufacturer, Manual Operation |
| 112 | Tunnel #3 | 3'-0" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 12 | Field Verify Existing Opening, Insulated door, panic hardware, closer w/ hold open, alum drip cap, weather strip |
| 113 | Storage 113 | PR 3'-0" x 4'-0" | F | MTL | PT | 04 sim | HM | PT | C1/A8.41 | C3/A8.41 | - | 12 | Field Verify Existing Opening, storeroom lockset, drip cap, weather strip, threshold, sweep. 6'-4"x4'-3" rough opening. |
| 114 | Storage 114 | PR 3'-0" x 4'-0" | F | MTL | PT | 04 sim | HM | PT | C1/A8.41 | C3/A8.41 | - | 12 | Field Verify Existing Opening, storeroom lockset, drip cap, weather strip, threshold, sweep. 6'-4"x4'-3" rough opening. |
| 115 | Storage 115 | PR 3'-0" x 4'-0" | F | MTL | PT | 04 sim | HM | PT | C1/A8.41 | C3/A8.41 | - | 12 | Field Verify Existing Opening, storeroom lockset, drip cap, weather strip, threshold, sweep. 6'-4"x4'-3" rough opening. |
| 116 | Storage 116 | PR 3'-0" x 4'-0" | F | MTL | PT | 04 sim | HM | PT | C1/A8.41 | C3/A8.41 | - | 12 | Field Verify Existing Opening, storeroom lockset, drip cap, weather strip, threshold, sweep. 6'-4"x4'-3" rough opening. |
| 117 | Tunnel #2 | 3'-0" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 13 | Insulated door, panic hardware, alum drip cap, weather strip |
| 117A | Tunnel #2 | 3'-6" x 7'-0" | F | FRP | FF | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 14 | Panic hardware, closer w/ hold open |
| 117B | Tunnel #2 | 3'-6" x 7'-0" | F | FRP | FF | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 14 | Panic hardware, closer w/ hold open |
| 117C | Tunnel #2 | 8'-0"x7'-4" | OHD | S.S. | FF | - | S.S. | FF | - | - | - | 8 | Insulated door, Motor operated |
| 118 | Storage 118 | PR 3'-0" x 4'-0" | F | MTL | PT | 04 sim | HM | PT | C1/A8.41 | C3/A8.41 | - | 12 | Field Verify Existing Opening, storeroom lockset, drip cap, weather strip, threshold, sweep. 6'-4"x4'-3" rough opening. |
| 119 | Storage 119 | PR 3'-0" x 4'-0" | F | MTL | PT | 04 sim | HM | PT | C1/A8.41 | C3/A8.41 | - | 12 | Field Verify Existing Opening, storeroom lockset, drip cap, weather strip, threshold, sweep. 6'-4"x4'-3" rough opening. |
| 120 | Tunnel #1 | 3'-0" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 12 | Field Verify Existing Opening, Insulated door, panic hardware, closer w/ hold open, alum drip cap, weather strip |
| 121 | Stadium Storage 121 | 3'-0" x 7'-0" | F | MTL | PT | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 9 | Insulated door, lockset, closer, alum drip cap, weather strip |

| MARK | LOCATION | DOOR | | | | FRAME | | | DETAILS | | ASSEM RATING | HW GROUP | REMARKS |
|-------------------|-----------------------|------------------|------------------------|------|--------|-------|-----------------|--------|-----------|-----------|-------------------------|-------------|--|
| | | Size | Type | Matl | Finish | Type | Material | Finish | Head | Jamb | | | |
| 121A | Stadium Storage 121 | 10'-0"x10'-0" | OHD | S.S. | FF | - | S.S. | FF | - | - | - | 8 | Insulated door, Motor operated |
| 121B | Stadium Storage 121 | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 15 | Insulated door, keyed lock from both sides, closer |
| 122 | Equipment Storage 122 | 3'-0" x 6'-6" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | | 2 | Field Verify Head Height, classroom lockset |
| 123 | Laundry 123 | 3'-6" x 7'-0" | F | MTL | PT | 03 | HM | PT | C1/A8.41 | C3/A8.41 | | 9a | Insulated door, lockset, closer, alum drip cap, weather strip |
| 123A | Laundry 123 | 3'-6" x 7'-0" | F | MTL | PT | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 4a | Field Verify Head Height, classroom lockset |
| 124 | Roof Access 124 | 3'-6" x 7'-0" | F | FRP | FF | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 16 | Insulated door, lockset, closer w/ hold open, alum drip cap, weather strip |
| 125 | Storage 125 | 3'-0" x 6'-8" | F | MTL | PT | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 17 | Insulated door, lockset, closer, alum drip cap, weather strip |
| 126 | Ramp RP-1 | 3'-0" x 4'-0" | F | MTL | PT | 03 | HM | PT | C1/A8.41 | C3/A8.41 | - | 17a | Storeroom lockset, drip cap, weather strip, threshold, sweep. |
| | | | | | | | | | | | | | |
| ROOF | | | | | | | | | | | | | |
| 201 | Roof | PR 3'-0" x 7'-0" | F | MTL | PT | 04 | HM | PT | C1/A8.41 | C3/A8.41 | | 18 | Lockset, no mullion, (2) sets of removable safety chains across opening on interior side |
| | | | | | | | | | | | | | |
| PRESSBOX | | | | | | | | | | | | | |
| 301 | Pressbox | 3'-0" x 7'-0" | F | MTL | FF | 01 | HM | PT | A7/A8.41 | E5/A8.41 | - | 9 | Insulated door, lockset, aluminum drip cap, weather strip |
| 302 | Pressbox | 3'-0" x 7'-0" | NG | MTL | FF | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 19 | Passage Lockset |
| 303 | Pressbox | 3'-0" x 7'-0" | NG | MTL | FF | 01 | HM | PT | G9/A8.50 | G9/A8.50 | - | 19 | Passage Lockset |
| 304 | Pressbox | 5'-0" x 4'-4" | OHD | S.S. | FF | - | S.S. | FF | - | - | - | 8 | Insulated door, Keyed lockset by manufacturer |
| | | | | | | | | | | | | | |
| TICKET BUILDING | | | | | | | | | | | | | |
| 100 | Ticket | 3'-0" x 7'-0" | F | MTL | PT | 03 | HM | PT | G11/A8.41 | E11/A8.41 | - | 13 | Insulated door, lockset, closer, aluminum drip cap, weather strip |
| 101A | Women | 3'-0" x 7'-0" | F | FRP | FF | 01 | HM | PT | E7/A8.41 | E11/A8.41 | - | 20 | Insulated door, push/pull lockset, closer, aluminum drip cap, weather strip |
| 101B | Women | 3'-0" x 7'-0" | F | FRP | FF | 01 | HM | PT | E7/A8.41 | E11/A8.41 | - | 20 | Insulated door, push/pull lockset, closer, aluminum drip cap, weather strip |
| 101C | Women | 5'-3" x 9'-0" | OHD | ALUM | FF | - | ALUM | FF | - | - | - | 8 | Perforated Slats, Keyed lockset by manufacturer |
| 102 | Men | 3'-0" x 7'-0" | F | FRP | FF | 01 | HM | PT | E7/A8.41 | E11/A8.41 | - | 20 | Insulated door, push/pull lockset, closer, aluminum drip cap, weather strip |
| 102A | Men | 6'-0" x 9'-0" | OHD | ALUM | FF | - | ALUM | FF | - | - | - | 8 | Perforated Slats, Keyed lockset by manufacturer |
| 102B | Men | 6'-0" x 9'-0" | OHD | ALUM | FF | - | ALUM | FF | - | - | - | 8 | Perforated Slats, Keyed lockset by manufacturer |
| 103 | Electrical | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | E7/A8.41 | E11/A8.41 | - | 17 | Insulated door, lockset, aluminum drip cap, weather strip |
| 104 | Restroom | 3'-0" x 7'-0" | F | FRP | FF | 01 | HM | PT | E7/A8.41 | E11/A8.41 | - | 21 | Insulated door, lockset, closer, aluminum drip cap, weather strip |
| 105 | Custodial | 3'-0" x 7'-0" | F | MTL | PT | 01 | HM | PT | E7/A8.41 | E11/A8.41 | - | 22 | Insulated door, lockset, closer w/ hold open, aluminum drip cap, weather strip |
| 106 | Storage | 3'-0" x 7'-0" | F | MTL | FF | 01 | HM | FF | G9/A8.50 | G9/A8.50 | - | 23 | Storeroom lockset |
| 107 | Storage | 3'-0" x 7'-0" | F | MTL | FF | 01 | HM | FF | G9/A8.50 | G9/A8.50 | - | 23 | Storeroom lockset |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| ABBREVIATIONS KEY | | | | | | | | | | | | | |
| ALUM | Aluminum | FRP | Plastic Laminate Faced | | | NG | Narrow Glass | | | PLAM | Plastic Laminate | | |
| CA | Clear Anodized | FGLS | Fiberglass | | | PT | Paint Color | | | PD | Partition Door | | |
| CL | Clear Finish | FV | Field Verify Condition | | | PR | Pair | | | STL | Steel | | |
| DG | Door Grille | HM | Hollow Metal | | | RL | Relite w/ Frame | | | ORG | Overhead Rolling Grille | | |
| FG | Full Glazing | MOT | Motorized | | | RF | Refinish Door | | | OCD | OVHD Counter Door | | |
| F | Flush | FB | Fabric Faced | | | SS | Stainless Steel | | | OHD | OVHD Coiling Door | | |
| FF | Factory Finish | NA | Not Applicable | | | WD | Wood | | | V | Vinyl Faced | | |
| | | | | | | | | | | | | | |

| MARK | LOCATION | DOOR | | | | FRAME | | | DETAILS | | ASSEM RATING | HW GROUP | REMARKS |
|------|----------|----------------|------|---|--------|-------|----------|--------|---------|------|-----------------|-------------|---------|
| | | Size | Type | Matl | Finish | Type | Material | Finish | Head | Jamb | | | |
| | | General Notes: | 1. | Reference sheet A6.01 for door and frames types. | | | | | | | | | |
| | | | 2. | Rekey and exchange factory lock cylinders in all overhead coiling doors and grilles to match Richland School District standard. | | | | | | | | | |

SECTION 08 11 13 - HOLLOW METAL DOORS & FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Standard hollow metal doors and frames.
- B. Related Sections:
 - 1. Division 08 Section "Flush Wood Faced Doors" for hardware and frame coordination.
 - 2. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
 - 3. Division 09 Sections "Painting" for field painting hollow metal doors and frames.

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.
 - 9. Details of conduit and preparations for power, signal, and control systems.
- C. Samples for Verification:
 - 1. For each type of exposed finish required, prepared on Samples of not less than **3 by 5 inches**.
 - 2. For the following items, prepared on Samples about **12 by 12** to demonstrate compliance with requirements for quality of materials and construction:
 - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
 - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.
- D. Other Action Submittals:
 - 1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than **450 deg F** above ambient after 30 minutes of standard fire-test exposure.

- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
 - D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784
 - E. Install doors in accordance with SDI-100 and building code standards for labeled doors
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
 - 1. Provide additional protection to prevent damage to finish of factory-finished units.
 - B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
 - C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.
- 1.6 PROJECT CONDITIONS
- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.
- 1.7 COORDINATION
- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis of Design: Ceco Door Products; an Assa Abloy Group company.; Product Imperial Series Doors, Maxim Series Doors, and CF Series Frames
 - 2. Amweld Building Products, LLC.
 - 3. Curries Company; an Assa Abloy Group company.
 - 4. Steelcraft; an Ingersoll-Rand company.
 - 5. Approved equal substitution in accordance with Division 01 procedures and requirements.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- G. Glazing: Comply with requirements in Division 08 Section "Glazing."
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 - 1) Locations: Exterior doors.
 - 3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
 - a. Beveled Edge: 1/8 inch in 2 inches.
 - 4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
 - 5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
 - 6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).
 - a. Width: 1-3/4 inches.
 - b. 14 gauge construction.
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
 - a. Width: 1-3/4 inches.
 - b. 18 gauge construction.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as full profile welded unless otherwise indicated.
 - 3. Frames for Level 3 Steel Doors: 12 gauge- (thick steel sheet.
- C. Interior Frames: Fabricated from cold-rolled steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as full profile welded unless otherwise indicated.
 - 3. Frames for Level 2 Steel Doors: 16 gauge- thick steel sheet.

4. Frames for Wood Doors: 16 gauge- thick steel sheet.
5. Frames for Borrowed Lights: 16 gauge- thick steel sheet.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.7 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.
- D. Lite Frames and Glazing
 1. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.
 2. For base bid glazing condition reference specification section 08 80 00.

2.8 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Doors:
 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 2. Glazed Lites: Factory cut openings in doors.
 3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
 - c. Compression Type: Not less than two anchors in each jamb.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
- G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of hollow metal work.
 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.9 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 1. Squareness: Plus or minus **1/16 inch**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 2. Alignment: Plus or minus **1/16 inch**, measured at jambs on a horizontal line parallel to plane of wall.
 3. Twist: Plus or minus **1/16 inch**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 4. Plumbness: Plus or minus **1/16 inch** measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with SDI 100, Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

- a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus **1/16 inch** measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus **1/16 inch** measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus **1/16 inch** measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus **1/16 inch** measured at jambs at floor.
 - C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: **1/8 inch** plus or minus **1/16 inch**.
 - b. Between Edges of Pairs of Doors: **1/8 inch** plus or minus **1/16 inch**.
 - c. Between Bottom of Door and Top of Threshold: Maximum **3/8 inch**.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum **3/4 inch**.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than **9 inches** o.c. and not more than **2 inches** o.c. from each corner.
- 3.4 ADJUSTING AND CLEANING
- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
 - B. Remove grout and other bonding material from hollow metal work immediately after installation.
 - C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 08 11 13

SECTION 08 17 00 – FRP FLUSH DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fiberglass reinforced polyester (FRP) flush doors in new hollow metal or aluminum door frames. Reference 08 Door Schedule.
- B. Related Sections:
 - 1. Division 08 Section "Standard Hollow Metal Frames" for door frames.
 - 2. Division 08 Section "Door Hardware" for door hardware for FRP doors.
 - 3. Division 08 Section "Aluminum Framed Openings" for storefront integration.

1.2 REFERENCES

- A. AAMA 1503-98 - Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- B. ANSI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
- C. ASTM B 117 - Operating Salt Spray (Fog) Apparatus.
- D. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- E. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- F. ASTM D 256 - Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
- G. ASTM D 543 - Evaluating the Resistance of Plastics to Chemical Reagents.
- H. ASTM D 570 - Water Absorption of Plastics.
- I. ASTM D 638 - Tensile Properties of Plastics.
- J. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- K. ASTM D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
- L. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics.
- M. ASTM D 1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
- N. ASTM D 2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- O. ASTM D 2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
- P. ASTM D 3029 - Impact Resistance of Flat Rigid Plastic Specimens by Means of a Falling Weight.
- Q. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.
- R. ASTM E 84 - Surface Burning Characteristics of Building Materials.
- S. ASTM E 90 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- T. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- U. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- V. ASTM E 331 - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- W. ASTM F 476 - Security of Swinging Door Assemblies.
- X. SFBC PA 201 - Impact Test Procedures.
- Y. SFBC PA 203 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
- Z. SFBC 3603.2 (b)(5) - Forced Entry Resistance Test.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.

- B. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.
- C. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.
- D. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.
- E. Hurricane Test Standards, Single Door with Single-Point Latching:
 - 1. Uniform Static Load, ASTM E 330: Plus or minus 75 pounds per square foot.
 - 2. Forced Entry Test, 300 Pound Load Applied, SFBC 3603.2 (b)(5): Passed.
 - 3. Cyclic Load Test, SFBC PA 203: Plus or minus 53 pounds per square foot.
 - 4. Large Missile Impact Test, SFBC PA 201: Passed.
- F. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.
- G. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.
- H. Salt Spray, Exterior Doors and Frames, ASTM B 117: Minimum of 500 hours.
- I. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.
- J. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.
- K. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
 - 1. Flame Spread: Maximum of 200, Class C.
 - 2. Smoke Developed: Maximum of 450, Class C.
- L. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
 - 1. Flame Spread: Maximum of 25.
 - 2. Smoke Developed: Maximum of 450.
- M. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-pounds per inch of notch.
- N. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.
- O. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
- P. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
- R. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
- S. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 3029: 120 in-lb.
- S. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.
- T. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.
- U. Chemical Resistance, ASTM D 543. Excellent rating.
 - 1. Acetic acid, Concentrated.
 - 2. Ammonium Hydroxide, Concentrated.
 - 3. Citric Acid, 10%.
 - 4. Formaldehyde.
 - 5. Hydrochloric Acid, 10%
 - 6. Sodium hypochlorite, 4 to 6 percent solution.
- V. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi.
- W. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 370 psi.
- X. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi.
- Y. Thermal and Humid Aging, Foam Core, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.

1.4 SUBMITTALS

- A. Comply with Division 01 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.

- C. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.
 - D. Samples:
 - 1. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
 - 2. Color: Submit manufacturer's samples of standard colors of doors and frames.
 - E. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
 - F. Manufacturer's Project References: Submit list of successfully completed projects including project name and location, name of architect, and type and quantity of doors manufactured.
 - G. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.
 - H. Warranty: Submit manufacturer's standard warranty.
- 1.5 QUALITY ASSURANCE
- A. Source Limitations: Obtain FRP doors from single source from single manufacturer.
 - B. Manufacturer's Qualifications
 - 1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 25 years successful experience
 - 2. Door and frame components from same manufacturer
 - 3. Evidence of a compliant documented quality management system
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.
 - B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
 - C. Handling: Protect materials and finish from damage during handling and installation.
- 1.7 PROJECT CONDITIONS
- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.
- 1.8 COORDINATION
- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- 1.9 WARRANTY
- A. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
 - B. Warranty Period: Ten years starting on date of shipment.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
- A. Basis of Design: Special-Lite, Inc., PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com. E-Mail info@special-lite.com
 - B. Manufacturers: Subject to compliance with requirements, provide substitution request under the provisions of Division 01.

2.2 MATERIALS

A. FRP Flush Doors

1. Model: Special-Lite Flush Doors full glazed units with middle cross mullion with SpecLite3 fiberglass reinforced polyester (FRP) face sheets.
2. Door Opening Size: As indicated on the Drawings and Door Schedule
3. Construction:
 - a. Door Thickness: 1-3/4 inches.
 - b. Stiles and Rails: Aluminum Alloy 6063-T5, minimum of 2-5/16-inch depth
 - c. Corners: Mitered
 - d. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom as standard tubular shaped stiles and rails reinforced to accept hardware as specified
 - e. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery. Welds, glue, or other methods are not acceptable
 - f. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance
 - g. Rail caps or other face sheet capture methods are not acceptable
 - h. Extrude top and bottom rail legs for interlocking continuous weather bar
 - i. Meeting Stiles: Pile brush weatherseals. Extrude meeting stile to include integral pocket to accept pile brush weatherseals
 - j. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded interlocking edge of bottom rail
 - k. Glue: Use of glue to bond sheet to core or extrusions is not acceptable
4. Face Sheet:
 - a. Material: SpecLite3 FRP, 0.120-inch thickness, finish color throughout. Abuse-resistant engineered surface
 - b. Texture: Pebble.
 - c. Color: to be selected by Architect from full standard color range.
5. Core:
 - a. Material: Poured-in-place polyurethane foam.
 - b. Density: Minimum of 5 pounds per cubic foot
 - c. R-Value: Minimum of 9
6. Cutouts:
 - a. Manufacture doors with cutouts for required vision lites, louvers, and panels
 - b. Factory install vision lites, louvers, and panels
7. Hardware:
 - a. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule
 - b. Factory install hardware

B. Aluminum Members:

1. Extrusions: ASTM B 221.
2. Sheet and Plate: ASTM B 209
3. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color

C. Fasteners:

1. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal
2. Compatibility: Compatible with items to be fastened
3. Exposed Fasteners: Screws with finish matching items to be fastened

D. Hardware:

1. Reference Section 08 71 00
2. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule
3. Factory install hardware

E. Vision Lites:

1. Factory Glazing: Reference Section 08 80 00
2. Lites in Exterior Doors: Allow for thermal expansion

3. Rectangular Lites:
 - a. Size: As indicated on the Drawings and door schedule
 - b. Factory glazed with screw-applied aluminum stops anodized to match perimeter door rails
 - F. Aluminum Finishes:
 1. Anodized Finish: Class I finish, 0.7 mils thick
 2. Clear 215 R1, AA-M10C12C22A41, Class I, 0.7 mils thick
- 2.3 FABRICATION
- A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on the Drawings
 - B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings]
 - C. Assembly:
 1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly
 2. Remove burrs from cut edges
 - D. Welding: Welding of doors or frames is not acceptable
 - E. Fit:
 1. Maintain continuity of line and accurate relation of planes and angles
 2. Secure attachments and support at mechanical joints with hairline fit at contacting members
 - F. Class A Flame Spread and Smoke Developed Rating
 1. Class A flame spread and smoke developed rating on interior faces of exterior panels and both faces of interior panels
 2. Flame Spread, ASTM E 84: Maximum of 25
 3. Smoke Developed, ASTM E 84: Maximum of 450

PART 3 - EXECUTION

- 3.1 EXAMINATION
 - A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.
- 3.2 PREPARATION
 - A. Ensure openings to receive frames are plumb, level, square, and in tolerance.
- 3.3 INSTALLATION
 - A. Install doors in accordance with manufacturer's instructions.
 - B. Install doors plumb, level, square, true to line, and without warp or rack.
 - C. Anchor frames securely in place.
 - D. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by Architect.
 - E. Set thresholds in bed of mastic and backseal.
 - F. Install exterior doors to be weathertight in closed position.
 - G. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
 - H. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.
 - I. Provide additional door clearance for ease of operation at south facing doors in direct sunlight to accommodate door expansion.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for installation of doors.

3.5 ADJUSTING

- A. Adjust doors, hinges, and locksets for smooth operation without binding.

3.6 CLEANING

- A. Clean doors promptly after installation in accordance with manufacturer's instructions.
- B. Do not use harsh cleaning materials or methods that would damage finish.

3.7 PROTECTION

- A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION 08 17 00

SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. In project areas where required for access to utilities: Non-rated and fire-rated wall and ceiling access doors and frame units. Furnish in quantities and sizes required for access purposes to utilities requiring service and general concealed space/attic access. Coordinate sizes, quantities, and locations with architectural drawings, as well as equipment access for Fire Protection, Mechanical and Electrical division. Fire ratings shall be as required to maintain the fire rating of the assembly in which it is mounted.
 - 2. In addition to the access doors required above: Provide an allowance for a total of **two (2)** additional 18"x18" non-rated access doors and **two (2)** additional 24"x24" non-rated access doors to be installed at locations directed by the owner and/or architect. Should less than **four (4)** access doors be required for this purpose, the value of the unused portion of the allowance shall be credited to the Owner.
 - 3. Furnish inserts and anchoring devices that must be built into other work for installation of access doors.
 - 4. See Code Plan for rating requirements
- B. Related Sections include the following:
 - 1. Division 08 Section "Overhead Doors" for motorized overhead doors requiring service access.
 - 2. Division 08 Section "Door Hardware" for mortise or rim cylinder locks and master keying.
 - 3. Division 09 Section "Gypsum Board" for wall and ceilings.
 - 4. Division 09 Section "Acoustical Tile Ceilings" for suspended acoustical tile ceilings.
 - 5. Divisions 21, 22, 23, 26, 27, and 28 for building systems trades.

1.2 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, materials, individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
- D. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.
- E. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.
- B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 or UL 10B for vertical access doors and frames.
 - 2. ASTM E 119 or UL 263 for horizontal access doors and frames.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units.

1.4 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- C. Steel Sheet: electrolytic zinc-coated, ASTM A 591 with cold-rolled steel sheet substrate complying with ASTM A 1008, Commercial Steel (CS), exposed.
- D. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
- E. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.2 STAINLESS-STEEL MATERIALS

- A. Rolled-Stainless-Steel Floor Plate: ASTM A 793, manufacturer's standard finish.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.
 - 1. Finish: Directional Satin Finish, No. 4.

2.3 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acudor Products, Inc.
 - 2. Babcock-Davis; A Cierra Products Co.
 - 3. Bar-Co, Inc. Div.; Alfab, Inc.
 - 4. Cendrex Inc.
 - 5. Dur-Red Products.
 - 6. Elmdor/Stoneman; Div. of Acorn Engineering Co.
 - 7. Jensen Industries.
 - 8. J. L. Industries, Inc.
 - 9. Karp Associates, Inc.
 - 10. Larsen's Manufacturing Company.
 - 11. MIFAB, Inc.
 - 12. Milcor Inc.
 - 13. Nystrom, Inc.
 - 14. Williams Bros. Corporation of America (The).
- B. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel and stainless-steel sheet.
 - 1. Locations: Wall and ceiling surfaces.
 - a. Utilize Stainless steel access doors at Restrooms, Locker Rooms, Kitchens, and Janitors Closets.
 - b. Utilize Standard units at all other locations.

2. Door: Minimum 0.060-inch- thick sheet metal, set flush with exposed face flange of frame.
3. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
4. Hinges: Spring-loaded, concealed-pin type.
5. Lock: Self-latching device with cylinder lock.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
 2. Provide mounting holes in frames for attachment of units to metal or wood framing.
 3. Provide mounting holes in frame for attachment of masonry anchors
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 1. For cylinder lock, furnish two keys per lock and key all locks alike.
 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

SECTION 08 33 13 – COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manual Operated overhead rolling counter door.
- B. Related Sections:
 - 1. Division 01 Section "Commissioning" for functional testing and demonstration of system
 - 2. Division 05 Section "Metal Fabrications" and "Cold Formed Metal Framing" for miscellaneous steel supports and trim.
 - 3. Division 08 Section "Door Hardware" for power operated door keyed switch.
 - 4. Division 09 Section "Painting" for finish painting of factory-primed doors.
 - 5. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the emergency-egress-door component will be fully operational after the seismic event."
 - 2. Seismic Component Importance Factor: 1.0.
- B. Operation Cycles: Provide overhead door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.3 SUBMITTALS

- A. Product Data: For each type and size of overhead door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Show locations of replaceable fusible links.
 - 3. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Verification: For each type of exposed finish required, provide samples of actual material with a minimum dimension of 6" in size.
- D. Qualification Data: For qualified Installer.
- E. Seismic Qualification Certificates: For overhead doors, accessories, and components, from manufacturer.
- F. Maintenance Data: For overhead doors to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead doors from single source from single manufacturer.
 - 1. Obtain operators and controls from overhead door manufacturer.

- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 DOOR MATERIALS AND CONSTRUCTION

- A. Door: Fabricate overhead-door curtain of interlocking metal slats, designed to withstand loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1. Manual Operated Overhead Coiling Counter Door:
 - A. The door curtain shall be constructed of interconnected strip stainless steel slats conforming to ASTM A-653. The curtain shall be constructed of 22 gauge No. 10 (1-1/4" high by 3/8" deep) slats.
 - B. The finish on the door curtain shall be #4 polish.
 - C. The bottom bar shall be constructed of tubular stainless steel measuring 2" high by 1-1/4" deep. The finish on the bottom bar shall be #4 polish.
 - D. The guides shall be constructed of box sections of stainless steel. The finish on the guides shall be #4.
 - E. The brackets shall be constructed of 11 gauge steel plate. The finish on the brackets shall be factory applied with a minimum thickness of 2 mils.
 - F. The barrel shall be steel tubing of not less than 4" in diameter. Oil tempered torsion springs shall be capable of correctly counter balancing the weight of the curtain and shall have both a main and an auxiliary spring. The barrel shall be designed to limit the maximum deflection to .03" per foot of opening width. The springs shall be adjusted by means of an exterior wheel. The barrel shall be unpainted.
 - G. The hood shall be fabricated from 24 gauge stainless steel and shall be formed to fit the curvature of the brackets. The finish on the hood shall be #4 polish.
 - F. The finish on all door curtain materials shall be: stainless steel.

2.2 LOCKING DEVICES & ACCESSORIES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door. Provide pull-down straps or pole hooks for doors more than 84 inches high.

2.3 MANUAL DOOR OPERATORS

- A. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.
- B. Push-up Door Operation: Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lbf.
- C. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than 25 lbf force to turn crank. Fabricate gearbox to be oil tight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.

2.4 OVERHEAD SUPPORTED DOOR ASSEMBLIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Cookson Company systems for the work of this section or comparable product by one of the following:
 - 1. ACME Rolling Doors.

2. Cornell Iron Works, Inc.
3. Lawrence Roll-Up Doors, Inc.
4. Mahon Door Corporation.
5. McKeon Rolling Steel Door Company, Inc.
6. Overhead Door Corporation.
7. Raynor
8. Windsor Door.

B. Motor Operated Overhead Counter Door: OCD - Overhead coiling solid slat security door.

1. **Location: Sales 107A, Press Box 304**
2. Cookson Company, Product: Insulated Rollup Counter Door – ESC30
3. Door Curtain Material: Stainless Steel interlocking slats.
4. Mounting: Face of Wall
5. Frame: Integral frame with stainless steel jamb, sill and head enclosure
6. Sill Configuration for Door: Stainless Steel sill.
7. Locking Devices: Equip door with hasp for padlock.
8. Door Finish: Stainless Steel
9. Trim: Provide all stainless steel trim profiles required to finish installation.
10. Operation: Push-up
11. Locking: Masterkeyable cylinder lock operable from coil side of bottom bar.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install overhead doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead doors, hoods, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead doors, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 1. Perform installation and startup checks according to manufacturer's written instructions.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead supported doors.

END OF SECTION 08 33 13

SECTION 08 33 23 – COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manual Operated Overhead Coiling Doors.
 - 2. Motor Operated Overhead Coiling Doors.
- B. Related Sections:
 - 1. Division 01 Section "Commissioning" for functional testing and demonstration of system
 - 2. Division 05 Section "Metal Fabrications" and "Cold Formed Metal Framing" for miscellaneous steel supports and trim.
 - 3. Division 08 Section "Door Hardware" for power operated door keyed switch.
 - 4. Division 09 Section "Painting" for finish painting of factory-primed doors.
 - 5. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified [and the emergency-egress-door component will be fully operational after the seismic event]."
 - 2. Seismic Component Importance Factor: 1.0.
- B. Operation Cycles: Provide overhead door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.3 SUBMITTALS

- A. Product Data: For each type and size of overhead door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Show locations of replaceable fusible links.
 - 3. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Verification: For each type of exposed finish required, provide samples of actual material with a minimum dimension of 6" in size.
- D. Qualification Data: For qualified Installer.
- E. Seismic Qualification Certificates: For overhead doors, accessories, and components, from manufacturer.
- F. Maintenance Data: For overhead doors to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead doors from single source from single manufacturer.

1. Obtain operators and controls from overhead door manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 DOOR MATERIALS AND CONSTRUCTION

- A. Door: Fabricate overhead-door curtain of interlocking metal slats, designed to withstand loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 1. Motor Operated Overhead Coiling Door:
 - A. The door curtain shall be constructed of interconnected strip stainless steel slats conforming to ASTM A-653. The curtain shall be constructed of 22 gauge No. 10 (1-1/4" high by 3/8" deep) slats. At Aluminum door locations, the curtain shall be constructed of 16 Gauge perforated slats.
 - B. The finish on the door curtain shall be #4 polish.
 - C. The bottom bar shall be constructed of tubular stainless steel or aluminum measuring 2" high by 1-1/4" deep. The finish on the bottom bar shall be #4 polish.
 - D. The guides shall be constructed of box sections of stainless steel or aluminum. The finish on the guides shall be #4.
 - E. The brackets shall be constructed of 11 gauge steel or aluminum plate. The finish on the brackets shall be factory applied with a minimum thickness of 2 mils.
 - F. The barrel shall be steel tubing of not less than 4" in diameter. Oil tempered torsion springs shall be capable of correctly counter balancing the weight of the curtain and shall have both a main and an auxiliary spring. The barrel shall be designed to limit the maximum deflection to .03" per foot of opening width. The springs shall be adjusted by means of an exterior wheel. The barrel shall be unpainted.
 - G. The hood shall be fabricated from 24 gauge stainless steel or aluminum and shall be formed to fit the curvature of the brackets. The finish on the hood shall be #4 polish.
 - F. The finish on all door curtain materials shall be: stainless steel or aluminum.

2.2 LOCKING DEVICES & ACCESSORIES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.
- C. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door. Provide pull-down straps or pole hooks for doors more than 84 inches high.

2.3 MANUAL DOOR OPERATORS

- A. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.
- B. Push-up Door Operation: Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lbf.
- C. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than 25 lbf force to turn crank. Fabricate gearbox to be oil tight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.

2.4 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. The door shall be operated at a speed of 2/3 foot per second by an open drip-proof electric motor with gear reducer in oil bath. The motor operator shall include a geared limit switch, and an electrically interlocked emergency chain operator. The motor starter shall be housed in a NEMA 1 housing and include a magnetic reversing starter size 0, a 24 volt control transformer, and complete terminal strip to facilitate field wiring. All motor operators shall be U.L. listed.
- D. Door Operator Location(s): Reference drawings and mounting condition for operator location indicated for each door.
 - 1. Provide one operator location per door – one on **exterior** area side with keyed switch. Verify switch location with Owner prior to installation. Keyed switch to match Owner's Schlage series keyway.
 - 2. Provide electrical switch controls to interface with owner's electrical security access control system.
- E. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 26 Section "Common Motor Requirements for Equipment" unless otherwise indicated.
 - 1. Electrical Characteristics:
 - a. Phase: Single phase.
 - b. Volts: 208 V.
 - c. Hertz: 60.
 - 2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
 - 3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed of **8 in./sec.**, without exceeding nameplate ratings or service factor.
 - 4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated. Provide two operator locations for each door – one outside and one inside of the door with key switches at both locations
 - 5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- F. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- G. Safety Features:
 - 1. The service door shall have installed on the bottom bar a Phantom Featheredge wireless device that will automatically reverse the door if the device detects an obstruction in the downward travel of the door.
 - a. The Phantom Featheredge shall consist of a rubber boot attached below the bottom bar with a switch secured to the back of the bottom bar. The Phantom Featheredge shall operate with air wave technology and shall not rely on pneumatic pressure or electrical contacts to operate. The Phantom Featheredge shall create an air wave that shall be detected by the switch which reverses the downward direction of the rolling door.
 - b. The Phantom Featheredge shall not require a connection cord or any means of electrical connection to the motor control panel.
 - c. The Phantom Featheredge shall be of fail-safe construction, and on every cycle shall perform a self diagnostic test. If any part of the Phantom Featheredge fails,

the door closing operation shall change from momentary pressure to constant pressure requiring constant pressure on the close control station to move the door in a downward motion. Repairing the Phantom Featheredge will automatically return the closing operation to momentary pressure.

- d. The operation of the Phantom Featheredge shall not be subject to interferences by temperature, barometric pressure, water infiltration, or punctures and small tears.
 - e. The Phantom Featheredge shall perform with an extremely small amount of impact pressure.
 - f. The Phantom Featheredge shall be wireless with remote transmitters at the head and base of the door. Coordinate transmitters with ceiling, jamb and soffit finishes.
- H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed **25 lbf**.
- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- 2.5 OVERHEAD SUPPORTED DOOR ASSEMBLIES
- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Cookson Company** systems for the work of this section or comparable product by one of the following:
- 1. ACME Rolling Doors.
 - 2. Cornell Iron Works, Inc.
 - 3. Lawrence Roll-Up Doors, Inc.
 - 4. Mahon Door Corporation.
 - 5. McKeon Rolling Steel Door Company, Inc.
 - 6. Overhead Door Corporation.
 - 7. Raynor
 - 8. Windsor Door.
- B. **Manual Operated Overhead Coiling Door: OHD - Overhead coiling solid slat security door.**
- 1. **Location: Referee Restroom 111**
 - 2. Cookson Company, Product: ESD10 Roll Up Security Door
 - 3. Operation: Manual push-up
 - 4. Door Curtain Material: Aluminum with Solid Slats.
 - 5. Mounting: Face of Wall.
 - 6. Sill Configuration for Door: No sill, close to interior finish floor condition.
 - 7. Locking Devices: Keyed lockset to match Owner's cores.
 - 8. Door Finish: Aluminum
 - 9. Trim: Provide all aluminum trim profiles required to finish installation.
- C. **Manual Operated Overhead Coiling Door: OHD - Overhead coiling perforated slat security door.**
- 1. **Locations: Ticket Building doors 101C, 102A, 102B**
 - 2. Cookson Company, Product: ESD10 Ventilated Service Door
 - 3. Operation: Manual push-up
 - 4. Door Curtain Material: Aluminum with Perforated Slats.
 - 5. Mounting: Between Jambs.
 - 6. Sill Configuration for Door: No sill, close to interior finish floor condition.
 - 7. Locking Devices: Keyed lockset to match Owner's cores.
 - 8. Door Finish: Aluminum
 - 9. Trim: Provide all aluminum trim profiles required to finish installation.
- D. **Motor Operated Overhead Coiling Door: OHD - Overhead coiling solid slat security door.**
- 1. **Locations: Field Storage 106, Stadium Storage 121, Tunnel #2 117**
 - 2. Cookson Company, Product: Insulated Roller Door – Thermiser Model ESD20

3. Door Curtain Material: Stainless Steel interlocking slats
4. Mounting: Face of Wall.
5. Sill Configuration for Door: No sill, close to interior finish floor condition.
6. Locking Devices: Keyed lockset to match Owner's cores.
7. Electric Door Operator:
 - a. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
 - b. Operator Location: Either side of door.
 - c. Motor Exposure: Interior.
 - d. Emergency Manual Operation: Chain type.
 - e. Provide electrical switch controls to interface with owner's electrical security access control system. Key switch to match Owner standard Schlage series keyway.
8. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar with wireless transmitter.
9. Door Finish: Stainless Steel
10. Trim: Provide all stainless steel trim profiles required to finish installation.
11. Insulation: R-Value 8.0min., U-Value 0.125

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install overhead doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead doors, hoods, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead doors, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 1. Perform installation and startup checks according to manufacturer's written instructions.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead supported doors.

END OF SECTION 08 33 23

SECTION 08 41 13 - ALUMINUM-FRAMED WINDOW SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior aluminum windows.
 - 2. All anchors, bridging, brackets, and attachments.
 - 3. Hardware, not specified elsewhere.
- B. System Description
 - 1. System to perform as required below in Performance Requirements
 - 2. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing
 - 3. All required internal steel reinforcement, anchors, bracing, and attachments back to the primary structure of the building (defined as that structure that is shown in the "S" sheets of the drawings) shall be the responsibility of this specification section. Shop drawings shall be engineered and shall clearly indicate all required bracing, bridging, kickers, clips, etc. necessary for the proper installation of the window system
- C. Related Sections:
 - 1. Division 01 Section "Quality Requirements" for special building envelope mock-up.
 - 2. Division 07 Section "Metal Panels" for composite metal panel integration into storefront system at select entry locations.
 - 3. Division 08 Section "FRP Flush Doors" for doors to be installed in aluminum frame system.
 - 4. Division 08 Section "Glazing" for glazing to be installed in aluminum frame system.

1.2 DEFINITIONS

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - 1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 - 2. Dimensional tolerances of building frame and other adjacent construction.
 - 3. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Noise or vibration created by wind and by thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
 - g. Failure of operating units.
- B. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..
- C. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

- D. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
 - 2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.
 - 3. Interior Ambient-Air Temperature: 75 deg F.
 - E. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.
 - F. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.38 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
 - G. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
 - 1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
- 1.4 SUBMITTALS
- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
 - B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
 - 2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
 - 3. Note outrigger mounting locations and any conflicts with compensating head or jamb conditions.
 - C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
 - D. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage (weep holes if required).
 - E. Qualification Data: For qualified Installer and testing agency.
 - F. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - G. Welding certificates.
 - H. Preconstruction Test Reports: For sealant.
 - I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

- J. Source quality-control reports.
- K. Field quality-control reports.
- L. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- M. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- D. Quality-Control Program for Structural-Sealant-Glazed System: Develop quality control program specifically for Project. Document quality-control procedures and verify results for aluminum-framed systems. Comply with ASTM C 1401 recommendations including, but not limited to, system material-qualification procedures, preconstruction sealant-testing program, procedures for system fabrication and installation, and intervals of reviews and checks.
- E. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
- G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
- H. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Field testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- I. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.

- e. Water leakage through fixed glazing and framing areas.
 - f. Failure of operating components.
- 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Aluminum Exterior Storefront, Entry, Curtain Wall and Window System, with 550 Heavy Wall Entrance doors as indicated in the drawings; internally steel reinforced, thermally broken, complete with deflection heads and base tracks with weep holes, for the work of this section. Fluoropolymer aluminum finish to match architects approved sample.
 - 1. Basis of Design
 - a. Windows: Kawneer TR-9100
 - 2. EFCO Corporation, equal product lines to above.
 - 3. United States Aluminum, equal product lines to above.
 - 4. Vistawall Architectural Products; equal product lines to above.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Structural Profiles: ASTM B 308/B 308M.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

2.3 GLAZING SYSTEMS

- A. Glazing: As specified in Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

2.4 WINDOW SYSTEMS

- A. Operable Windows in Storefront Framing System: Basis of Design – Kawneer TR-9100 Single Hung Windows.
- B. Aluminum Operable Windows in Storefront Framing System:
 - 1. Material Standard: ASTM B 221; G.S. 10A-T5; 6063-T5 alloy and temper
 - 2. Total Frame Depth: Not less than 3-1/4" (1" glass)
 - 3. Member Wall Thickness: Each framing member shall have a wall thickness sufficient to meet the specified structural requirements.
 - 4. The frame and ventilator corner construction shall consist of a mitered corner joint with an internal clip, sealed and mechanically staked.
 - 5. The frame shall have a continuous primary weather seal of polyethylene clad urethane foam, the rainscreen weather stripping shall be dual durometer Santoprene. Each corner shall be neatly mitered.
 - 6. The frame and ventilator shall be factory fabricated and assembled
 - 7. Interior insect screen at each location, full width and height of operable area with screen access door at lever.

2.5 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."
 - 1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

2.6 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

- A. Permanodic Anodized Aluminum, Architectural Class I, 0.7 mils minimum.
- B. [Color as noted in section 09 00 00 material legend.](#)

2.8 SOURCE QUALITY CONTROL

- A. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 - 6. Seal joints watertight unless otherwise indicated. Finish installation shall be leak-proof.
- B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
 - D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.
 - E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.
 - F. Install glazing as specified in Division 08 Section "Glazing."
 - G. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.
- 3.3 ERECTION TOLERANCES
- A. Install aluminum-framed systems to comply with the following maximum erection tolerances:
 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
 2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
 - B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.
- 3.4 FIELD QUALITY CONTROL
- A. Testing Agency: Owner may engage a qualified independent testing and inspecting agency to perform field tests and inspections.
 - B. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements. All final installations shall be leak-proof under normal conditions.
 - C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - D. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
 - E. Prepare test and inspection reports.

END OF SECTION 08 41 13

SECTION 08 45 23 - INSULATED TRANSLUCENT SANDWICH PANEL SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. All requirements of the contract documents form an integral part of the work specified herein; in particular refer to the conditions (general or otherwise) and Division 01 of the specifications including all subdivisions thereof.
- B. Insulated translucent panels shall consist of 2-3/4 thick factory prefabricated sandwich- panel and system, factory assembled into a single unit including installation.
- C. Requests for substitutions must be approved by addendum no later than ten (10) days prior to bid due date and in keeping with Division 01 (Substitutions) of the specification. Requests must include; a sample of proposed system, test data, ICCE Listing and engineering.
- D. Work included: Supply all labor and materials required to deliver and install the insulated translucent wall panel system. The following major items are included:
 - 1. Prefabricated insulated translucent sandwich panel system.
 - 2. Aluminum flashing.
 - 3. Clamptite installation system.
 - 4. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing up to 3/8 inch.
 - 5. Contractor shall provide all necessary anchorage, and steel support members necessary for the fully functioning installation of the specified system. All required internal steel reinforcement, anchors, bracing, and attachments back to the primary structure of the building (defined as that structure that is shown in the "S" sheets of the drawings) shall be the responsibility of this specification section. Shop drawings shall be engineered and shall clearly indicate all required bracing, bridging, kickers, clips, etc. necessary for the proper installation of the system
- E. Related work specified elsewhere:
 - 1. Framing
 - 2. Structural Steel
 - 3. Siding
 - 4. Metal flashing and counter flashing

1.2 QUALITY ASSURANCE

- A. Manufacturers and Erector's Qualifications.
 - 1. Sandwich panel system manufacturer must be listed by a recognized building code authority, including the International Code Conference (ICC) which requires quality control inspections and fire, structural and water infiltration testing by an approved agency for sandwich panel system. Panels used on this project must be included in ICCE listing.
 - 2. Quality control inspections and testing conducted at least once each year shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with Acceptance Criteria for Sandwich Panels as regulated by the ICC - ES or equivalent.
 - 3. Materials and products shall be manufactured by a company continuously and regularly employed in the manufacture of similar materials for a period of at least fifteen (15) consecutive years. They must show evidence of these materials being satisfactorily used on at least ten (10) projects of similar size scope and type within such a period and at least five (5) of the projects shall have been in successful use for ten (10) years or longer.
 - 4. Erection shall be by an installer who has been in the business of erecting similar materials for a least ten (10) consecutive years; and can show evidence of satisfactory completion of projects of similar size scope and type.

- B. Performance Requirements: The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.

1.3 SUBMITTALS

- A. Delegated Design: Design of the insulated translucent sandwich panel systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated. Shop drawings shall be reviewed, stamped and signed by a professional engineer licensed in the State of Washington.
- B. Submit shop drawings, color samples and system assembly in accordance with Division 01; submittals
- C. Test reports to be furnished by sandwich panel system manufacturer in accordance with Division 01, Submittals. The manufacturer shall submit certified test reports made by an independent testing organization for each type and class of panel system. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if by current manufacturer and indicative of products used on this project. Test reports required are:
 - 1. Flame Spread and Smoke Development (ASTM E-84 by UL 723)
 - 2. Burn Extent (ASTM D-635)
 - 3. Color Difference (ASTM D-2244)
 - 4. Impact Strength (Free Falling Ball Method)
 - 5. Tensile Bond Strength (ASTM C-297 after aging by ASTM D-1037)
 - 6. Shear Bond Strength (ASTM D-1002 after 5 separate conditions.)
 - 7. Beam Bending Strength (ASTM E-72)
 - 8. Insulation "U" Factor (by NFRC-100; ASTM C-236, E-1423 and C-1199)
 - 9. NFRC Certification for complete system.
 - 10. Condensation Resistance Factor (AAMA 1503.1)
- D. ICCE Evaluation report for sandwich panels and proof of regular, independent quality control monitoring shall be submitted.
- E. Current UL listing documenting that face sheets are manufactured by the translucent panel fabricator.
- F. Complete energy and structural calculations and all above data must be submitted with any request to be included as an approved product to bid this section.

1.4 PRODUCT HANDLING

- A. Store translucent panels units on the long edge, several inches above the ground, blocked and under cover to prevent warping and in accordance with manufacturer's storage and handling instructions.
- B. Combustion type heaters must be properly vented to the exterior to prevent possible staining of panels.

1.5 WARRANTY

- A. Warranty: Provide Two-Year Warranty
 - 1. Warranty shall cover installation, operation, materials and labor.
 - 2. Warranty shall commence on date of substantial completion.

PART 2- MATERIALS

2.1 MANUFACTURER

- A. Approved Manufacturers:
 - 1. Kalwall Corporation,
 - 2. Major Industries
 - 3. Approved equal in accordance with Division 01 procedures and requirements.

2.2 TRANSLUCENT FACING

- A. Translucent fiberglass faces shall be manufactured from glass fiber reinforced thermo-set resins by insulated panel system fabricator specifically for architectural use. Thermoplastic (polycarbonate and acrylic) faces are not acceptable.
- B. Flammability - The interior face sheet shall be U.L. listed and have a flame spread rating no greater than 50 and smoke developed no greater than 250 when tested in accordance with UL 723. Burn extent by ASTM D-635 shall be no greater than 1". Faces shall not deform, deflect or drip when subjected to fire or flame, or delaminate when exposed to 300 degree F for 25 minutes.
- C. Weatherability -
 - 1. The full thickness of the Kalwall exterior face shall not change color more than 3.0 Hunter or CIE Units (DELTA E by ASTM D-2244) after five (5) years outdoor South Florida weathering at 5 facing South. This shall be determined by the average of at least three (3) white samples with and without a protective film or coating to ensure maximum long-term color stability. Color stability shall be unaffected by abrasion or scratching
 - 2. The exterior face shall have a permanent glass veil erosion barrier embedded integrally to provide maximum long-term resistance to reinforcing fiber exposure. Sacrificial plastic surface films, coatings or veils are not acceptable.
- D. Appearance
 - 1. The faces shall be uniform in color to prevent splotchy appearance. Faces shall be completely free of ridges and wrinkles, which prevent proper surface contact in bonding to the aluminum grid core. Clusters of air bubbles and pinholes which collect moisture and dirt will not be acceptable.
 - 2. Exterior face sheets shall be .070 thick and CRYSTAL in color. Interior face sheets shall be .045 thick and WHITE in color. Faces shall not vary more than $\pm 10\%$ in thickness. Provide sample assembly for review.
- E. Strength - The exterior face sheet shall be uniform in strength and repel an impact equal to 60 ft lbs without fracture or tear when impacted by a 3 1/2" diameter, 6.37 lb. free falling ball, and be resistant to penetration by pencil point.

2.2 GRID CORE

- A. Panels shall incorporate an aluminum broken I-beam grid core of 6063-T6 or 6005-T5 aluminum alloy with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I-beam shall be no less than 7/16". I-beam for the grid shall be machined to tolerances of not greater than $\pm .002$ ".
- B. Panels shall withstand 1200 degrees F fire for minimum one (1) hour without collapse or exterior flaming.

2.3 ADHESIVE

- A. The laminate adhesive shall be heat and pressure resin-type engineered for structural sandwich panel use with a minimum of 25 years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesive".
- B. Minimum tensile strength shall be: 750 PSI by ASTM C-297 after two (2) exposures to six (6) cycles each of the aging conditions prescribed by ASTM D-1037.
- C. Minimum shear strength by ASTM D-1002 after exposure to five separate aging conditions.
 - 1. 50% relative humidity at 73 degrees F: 540 PSI
 - 2. 182 degrees F: 100 PSI
 - 3. Accelerated aging by ASTM D-1037 at room temperature: 800 PSI
 - 4. Accelerated aging by ASTM D-1037 at 182 degrees F: 250 PSI
 - 5. 500 Hour Oxygen Bomb by ASTM D-572: 1400 PSI

2.4 PANEL CONSTRUCTION

- A. Panels shall have a thickness of 2-3/4 with a:
 - 1. U factor .23, by NFRC Certified Laboratory.
 - 2. Light Transmission of 20%.
 - 3. Solar Heat Gain Coefficient of .28.
 - 4. Complete system shall be NFRC Certified.

- B. Translucent panels shall be a true sandwich panel of flat fiberglass sheets bonded to a grid core of mechanically interlocking Aluminum I-beams and shall be laminated under a controlled process of heat and pressure and deflect no more than 1.9" at 30 PSF in 10' by ASTM E-72.
- C. All grid patterns shall be 12" x 48" equal spacing Vertikal and be symmetrical about the vertical center-line of each panel.
- D. The adhesive bonding line shall be straight cover the entire width of the I-beam and have a neat sharp edge.
- E. Translucent panels and aluminum perimeter frame shall be pre-assembled and sealed at the factory. Panels shall be shipped to jobsite ready for erection.

2.5 BATTENS AND PERIMETER CLOSURE SYSTEMS

- A. Closure System shall be extruded 6063-T6 and 6063-T5 aluminum clamp-tite screw type.
- B. All batten and perimeter closures to be supplied with 300 series stainless steel screws excluding final fasteners to the building. Aluminum battens and cap plates shall be field installed.
- C. All exposed aluminum to be architectural corrosion resistant finish which meets the performance requirements of AAMA 2604 with color to be selected from manufacturer's full color standards.

2.6 FLEXIBLE SEALING TAPE

- A. Sealing tape shall be manufacturer s standard pre-applied to closure system at the factory under controlled conditions.

PART 3 - EXECUTION

3.1 PREPARATION

- A. The general contractor shall prepare openings including isolating dissimilar materials from aluminum system which may cause damage by electrolysis.

3.2 ERECTION

- A. The erector shall erect translucent panel unit system in strict accordance with approved shop drawings as supplied by manufacturer. Fastening and sealing shall be in strict accordance with manufacturer s shop drawings. All aluminum shall be cleaned before sealants are applied.
- B. After other trades have completed work on adjacent material carefully inspect translucent panel installation and make adjustments necessary to insure proper installation and weather-tight conditions.
- C. Provide all staging lifts and hoists required for the complete insulated panel unit system installation including staging etc. necessary for field measuring and installation.

END OF SECTION 08 45 23

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Hardware for Standard steel and solid core wood doors.
 - 2. Master steel key cabinet sized for growth.
- B. Related Sections
 - 1. Section 08 11 13 Hollow Metal Doors & Frames
 - 4. Section 08 33 00 Overhead Doors

1.2 REFERENCES

- A. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- B. ANSI A 156 - Door Hardware (ANSI/BHMA Standards)
- C. NFPA 80 - Fire Doors and Windows.
- D. AWI - Architectural Woodwork Institute - Architectural Wood Work Quality Standards.
- E. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
- F. NFPA 252 - Fire Tests of Door Assemblies.
- G. UL 10B - Safety Fire Tests of Door Assemblies.
- H. American Disabilities Act Accessibility Guidelines.
- I. BHMA - Builders Hardware Manufacturers Association - A156 Series.
- J. UL 305 - Safety Panic Hardware.

1.3 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Verification of Door and Hardware Schedule – submit written confirmation that supplier has reviewed and verified the function and compatibility of the products furnished and installed under this section.
- C. Keying Information – sample submittal format follows this section
- D. Key biting schedule data – sample format follows this section
- E. Submittal Sequence: Submit verified schedule at earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- F. Installation Meeting: Prior to installation of hardware, manufacturers' representatives along with the project architect shall arrange and hold a jobsite meeting to instruct the installing contractors personnel on the proper installation of their respective products. Seminar shall be attended by installers of hardware (including electrical hardware) for aluminum, hollow metal and wood doors. Training to include the use of installation manuals, hardware schedule, templates and physical product samples.
- G. Keying Meeting and Schedule: Arrange for a keying meeting with the Architect and Owner, hardware supplier, and other involved parties prior to return of the reviewed finish hardware schedule, to insure all locksets are functionally correct and keying fulfill the project requirements. Initial keying meeting to occur within 60 days of Notice to Proceed. As soon as possible after the keying conference, typed copies of the keying schedule shall be furnished to the Owner and Architect for review.

- H. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g. hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings or other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule. Allow 30 days minimum for A/E and Owner to review the submittal
- I. Templates: Furnish hardware templates to each fabricator of door, frames and other work to be factory prepared for the installation of hardware. Check shop drawings of such other work to confirm that adequate provisions are made for proper location and installation of hardware.
- J. Contract Close-out Requirements.
 - 1. Project Record Documents.
 - a. Submit under provisions of Division 01.
 - b. Record actual locations of installed cylinders and their master key code.
 - 2. Operation and Maintenance Data
 - a. Submit under provisions of Division 01.
 - b. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with the following requirements:
 - 1. ANSI A117.1
 - 2. NFPA 101.
 - 3. NFPA 80.
 - 4. NFPA 252.
 - 5. American Disabilities Act Accessibility Guidelines.
 - 6. BHMA - A115 Series.
- B. Qualifications
 - 1. Manufacturer: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
 - 2. Hardware Supplier: Company specializing in supplying commercial door hardware with 5 years documented experience, approved by manufacturer, and located within 150 miles of the project
 - 3. Hardware Supplier Personnel: Employ a certified Architectural Hardware Consultant (AHC) to assist in the work of this section. AHC should review construction documents and verify hardware function for given location and base bid or requirements for a complete code complying, functioning installation.
- C. Regulatory Requirements
 - 1. Conform to applicable code for requirements applicable to fire rated doors and frames.
 - 2. Fire Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01.
- B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.
- C. Deliver keys to Owner by security shipment direct from hardware supplier.
- D. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

- E. Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately replaceable so that completion of the work will not be delayed by hardware losses, both before and after installation.
- 1.6 SEQUENCING AND SCHEDULING
- A. Coordinate work under provisions of Division 01.
 - B. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- 1.7 EXTENDED WARRANTY
- A. Under provisions of Division 01. Include coverage for all hardware.
 - B. Extended Warranty - Manufacturer's standard for individual item.
- 1.8 MAINTENANCE
- A. Provide under provisions of Division 01.
 - B. Provide special wrenches and tools applicable to each different or special hardware component.
 - C. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 - PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS
- A. Manufacturers: The numbers shown for the hardware items are taken from the catalogs of the manufacturers indicated and are for the purpose of establishing quality, design, and function. Except as listed as approved substitutes by item basis, no other manufacturer substitutions will be allowed unless approved by the Architect ten (10) days prior to bid opening. No substitutions will be allowed after bid opening.
 - B. The numbers shown in the hardware groups are taken from the catalogs of the following manufacturers and are for the purpose of establishing quality, design and function. Except as listed, no substitution will be allowed unless approved by the Architect.

| ITEM | MANUFACTURER | APPROVED SUBSTITUTE |
|---------------------|----------------|-----------------------|
| Butts | McKinney | Stanley |
| Continuous Hinges | Select | Pemko |
| Locksets, Latchsets | Corbin Russwin | None |
| Cylinders | KABA Peaks | None |
| Exit Devices | Corbin Russwin | None |
| Removable Mullions | Special-Lite | Corbin Russwin |
| Flushbolts | Rockwood | Ives, Trimco |
| Push/Pull Plates | Rockwood | None |
| Closers | Norton | None |
| Auto Operators | Norton | None |
| Wall Stops | Rockwood | Trimco, Ives |
| Magnetic Holders | Rixson | LCN |
| Protection Plates | Rockwood | Trimco, Ives |
| Thresholds | Pemko | Reese, National Guard |
| Door Bottoms | Pemko | Reese, National Guard |
| Gasketing | Pemko | Reese, National Guard |
| Door Drip Cap | Pemko | Reese, National Guard |

- 2.2 MATERIALS/PRODUCTS:
- A. Provide end products of one manufacturer for each item specified.
 - B. Finishes: BHMA 1301 Standards.

1. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, and except as otherwise indicated. Reduce. Differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lockset (or push-pull units) for color and texture.
 2. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standard, but in no case less than specified for the applicable units of hardware by referenced standards.
 3. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI A156.18 "Materials and Finishes Standard" and Builders Hardware Manufacturer's Association (BHMA), including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
 4. Hardware in general to be BHMA 626 and /or 652, Satin Chromium Plated. Applicable Stainless Steel hardware shall be BHMA 630, Satin Stainless Steel.
 5. Door closers to be in plastic covers finished to match other hardware.
- C. Hardware shall meet NFPA-80 requirements for Fire Assembly Rating and be Underwriters Laboratories, Inc. approved for specific application: See Door Schedule.
- D. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- E. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws, except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
- F. Provide concealed fasteners for hardware units which are exposed when door is closed, except when no standard units of type specified are available with concealed fasteners. Do not use through-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each through-bolt or use hex screw fasteners.

2.3 KEYING

- A. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), integrated with the existing system
- B. Existing system is: KABA Peaks. (No Substitution). Comply with Owner's instructions for master keying, and, except as otherwise indicated; provide individual change keys for each lock which is not designated to be keyed alike with a group of related locks. Provide temporary cylinders for use during the construction Period.
- C. Provide construction cores and keys during the construction period. Permanent cores and keys prepared according to the accepted keying schedule will be furnished to the owner by the Supplier prior to occupancy. The Owner will install permanent interchangeable cores and return the construction cores to the Supplier.
- D. All cylinders shall be keyed into the existing masterkey system.
- E. Furnish keys and related hardware in the following quantities:
 1. Key quantities to be determined.

- F. Furnish key cabinet, sheet steel construction, piano hinges, door keyed to master key system, sized for 10% future key growth, key hook labeling, baked enamel finish. Color to be selected by Architect from manufacturer's standard full color range.
 - 1. Manufacturer: Telkee
 - 2. Product – Fully recessed in wall, No AWC1505 150 key capacity
- G. Key all doors except passage, privacy and interior vestibule doors.

2.4 HINGES

A. General

- 1. ANSI A 156J
- 2. Quantity per door leaf height (minimum):
 - 1 pair to 5'-0" high
 - 1-1/2 pair 5'-1" to 7'-7"
 - 2 pair 7'-7" to 10'-0"
- 3. Hinge height (minimum):
 - 4 1/2" to 3'-0" door width
 - 5" 3'-1" to 4'-0"
- 4. Hinge width (minimum): twice the door thickness, plus the jamb trim project at 180 degree swing.
- 5. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template produced units.
- 6. Screws: Furnish Phillips flat-head machine and/or wood screws for installation of units. Finish screw heads to match surface of hinges or pivots. Provide stainless steel fasteners on exterior doors.
- 7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges - Steel pins.
 - b. Non-Ferrous Hinges - Stainless steel pins.
 - c. Out-Swinging Doors - Non-removable Pins(NRP). Use set screw in barrel type.
 - d. Tips - Flat button and matching plug, finished to match leaves, except where hospital tip (HT) indicated.

B. Mortise Hinges / Continuous Hinges

- Full Mortise Hinges, 5-knuckle, flat button tip, anti-friction bearing type. Use Brass/Bronze type hinges on all exterior exposed doors.
- Hinge A: High frequency use , heavy weight (entry, class, restroom)
 McKinney: TA2714 Steel (652)
 TA2314 Stainless (630)
 T4A3786 Steel (652)
 T4A3386 Stainless (630)

Hinge B:
 Select: SL11 Alum
 SL21 Alum

2.5 LOCKSETS AND LATCHES

A. General

- 1. ANSI A156.13, Series 1000, Security Grade 1 ANSI A117.1, Accessibility Code
- 2. Features:
 - a. Lockset and Trim: BHMA 630 Finished.
 - 1) Trim: VR NSV (mortise)
 - b. Backset: 2-3/4 inch.
 - c. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware.

- d. Latchbolt: 9/16" minimum throw, 3/4" on Fire Door pairs, and Auxiliary Deadlocking Latchbolt feature.
- B. Mortise & Cylindrical
 - 1. Lockset x ANSI No. ____
 - 2. ANSI No.
 - F01 Passage
 - F13 Privacy
 - F04 Entry/Office
 - F05 Classroom
 - F076 Storage/Mechanical
 - 3. Approved Manufacturers:
 - a. Corbin Russwin
 - b. No other approved manufacturers

2.6 EXIT DEVICES

- A. General
 - 1. ANSI A156.3 Grade 1 ANSI A117.1 Accessibility Code
 - 2. ANSI/BHMA 630 Finished.
 - 3. Fire-rated and non-rated type; see Door Schedule.
 - 4. Cylinder: Rim and/or Mortise, interchangeable core at all doors
 - 5. Push-Bar Style Device.
- B. Rim exit device with pull trim
 - 1. Exit Device – ED4000 / ED5000 – Corbin Russwin
 - a. Single door application.
 - b. Surface applied; single point latching.
 - c. Standard Strike
 - 2. Exit Device - ED5000 – Corbin Russwin
 - a. Pair of doors with key removable mullion.
 - b. 2 independent active doors.
 - c. Surface applied each door: single point latching.
 - d. Standard strike
 - e. No other approved manufacturers
 - 3. Exit Device – ED5400 – Corbin Russwin
 - a. Pair of doors with no mullion.
 - b. 2 independent active doors.
 - c. Surface applied each door: single point latching.
 - d. Standard strike.
 - e. No other approved manufacturers.

2.7 CLOSERS / AUTO OPERATORS

- A. General
 - 1. ANSI A156.4, Grade 1 ANSI A117.1 Accessibility Code
 - 2. Provide closer on active leaf of non-rated paired doors.
 - 3. Install closer on interior (push) side of door.
 - 4. Size closer as per Manufacturer's recommendations.
 - 5. Install thru-bolts with backer plates on all wood doors.
 - 6. Provide parallel arm mounting ANSI/BHMA CO2021. Use regular arm mounting only where parallel mounting is not appropriate or recommended.
 - 7. Provide heavy duty type arms.
 - 8. Covers: 7500 P Norton (molded plastic); Color: Aluminum, BHMA 689.
- B. Schedule:

| | Item | Location | Norton No. |
|----|----------|--------------------------------|------------|
| 1. | Closer A | Handicap Rated, Interior Doors | PR7500, |
| 2. | Closer B | Door Stop, Handicap | UNI7500 |

3. Auto Op A Handicap Entrance 6030

C. No other approved manufacturers

2.8 PUSH-PULLS

A. General

1. ANSI/BHMA US32D finished.
2. Plates: 1/8" extruded, beveled top and bottom, 4" x 16".
3. Pulls: Bolt Through Door, 3/4" diameter x 8".
4. Push Plates: Countersink pull through bolts and cover with push plates.

B. Schedule:

1. Push/Pull — 110x73C/73CL.

2.9 STOPS AND HOLDERS

A. General

1. ANSI A156.16
ANSI A117.1 Accessibility code.
2. ANSI/BHMA 626 finished.
3. Fasteners
 - a. Machine screws and threaded anchors at concrete or masonry.
 - b. Self tapping screws at wood or metal framing.
4. Metal risers at carpet floors.
5. Electromagnetic Holder
 - a. ANSI A156.15.
 - b. Underwriters Laboratory, Inc. (U.L.)
 - c. Fail Safe Operation
 - d. Power Source: 24 V. AC/DC from Fire Alarm System.
Coordinate with Division 26.
 - e. Provide extension arms and special mounting plates as required for complete installation of each electromagnetic holder.
Contractor shall provide any special mounting hardware as a part of the base bid.

B. Schedule

- | | | |
|----------------------------------|-------|----------|
| 1. Wall Stop | 403 | Rockwood |
| 2. Floor Stop | 463 | Rockwood |
| 3. <u>Electromagnetic Holder</u> | FM990 | Rixson |

2.10 BOLTS

A. General

1. ANSI A156.16
2. ANSI/BHMA 626 finished.
3. Automatic top and bottom bolts on inactive leaf of a pair of fire assembly rated doors, complete with dust-proof strike.

B. Schedule:

- | | | |
|-------------------------|-----------|----------|
| 1. Flush Bolt | 555, 557, | Rockwood |
| a. Approved Substitute: | Ives | |
| 2. Floor Strike | 570 | Rockwood |
| a. Approved Substitute: | Ives | |

2.11 DOOR PLATES

A. General

1. ANSI A156.6
2. Stainless Steel ANSIBHMA 630 finished
3. Width of door leaf less 2" at all doors
4. Solid Metal (0.062 inch), all edges beveled
5. Install on push side of door

- B. Schedule:
 - 1. Kickplate: width specified above x 10" high Rockwood
- 2.12 THRESHOLDS
 - A. General
 - 1. ANSI A117.1, Accessibility Code
 - 2. Aluminum, ANSIBBHMA 719 finished
 - 3. Thermal Break (where specified)
 - 4. Stainless Steel Anchors
 - B. Schedule:
 - 1. Threshold 273X4AFG, 1715AK PEMKO
 - 2. Threshold, 1715AK
- 2.13 WEATHERSTRIP AND SEALS
 - A. General
 - 1. NFPA 80, 2-5.4 at fire rated and smoke assembly doors
 - 2. Aluminum, ANSI/BHMA 719 finished
 - 3. Seals, vinyl and silicone
 - B. Schedule:

| | |
|-----------------------|---------------------------------|
| 1. Door Seal | S88D PEMKO (Fire/Smoke/weather) |
| 2. Meeting Stile Seal | 18041 PEMKO |
| 3. Door Sweep | 18062CNB PEMKO (Exterior Door) |
| 4. Astragal | 357SP Pemko |
- 2.14 REMOVABLE MULLION
 - A. General
 - 1. ANSI 156.3
 - 2. Aluminum Mullion, SP28 finished.
 - 3. Steel Mullion.
 - B. Schedule:
 - 1. Key Removable Mullion SL60K Special-Lite
- 2.15 DOOR DRIP CAP
 - A. General
 - 1. Clear Anodized Aluminum, 346C
 - 2. Install full width of door opening with 2" extension of coverage on both sides of operable door.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 01.
- B. Verify that doors and frames are ready to receive work and dimensions are as instructed by the Manufacturer.
- C. Verify that electric power is available to power operated devices and of the correct characteristics.

3.2 INSTALLATION

- A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Architect.
- B. Use templates provided by hardware item manufacturer.
- C. Conform to ANSI 117.1 and American Disabilities Act Guidelines for positioning requirements for the handicapped.

- D. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protection with finishing work specified in the Division 9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.
- E. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units which are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- G. Set supporting elements of thresholds for exterior doors in full bed of Type E sealant as specified in Section 07 92 00.

3.3 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01.
- B. Architectural Hardware Consultant to inspect finished installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUST AND CLEAN

- A. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to punch list, acceptance or occupancy, and make final check and adjustments of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- B. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area and before substantial completes the installer, accompanied by representatives of the latch and lock, exit device, and closer manufacturers, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware, and to consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials, or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.5 HARDWARE SCHEDULE - HARDWARE GROUPS

PROVIDE ADDITIONALLY:

1 ea Key Cabinet AWC-150S

OWNER STOCK:

12 ea Permanent Cores 8840-25-1006 PC4

HW1

- 1 ea Continuous Hinge SL11 CLHD 83
- 1 ea Exit Device ED5200S 630 M52 M54 M110 CLS6
- 1 ea Pull Trim TH957 630 CLS6
- 2 ea Temp Green Const Core
- 2 ea Perm Core 3840-25-1006
- 1 ea Closer/Stop UNI7500 AL SNB
- 1 ea Threshold 273X4AFG 36 x Pemkote
- 1 ea Sweep 345AV 36
- 1 ea Drip Cap 346C 40
- Weatherstrip by door mfr

HW2

- 3 ea Hinges TA2714 26D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML2055VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Wall Stop 416 626
- 1 set Gasket S88D17

HW3

- 3 ea Hinges TA2714 26D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML2065 NSA 630 M19VN CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Closer 7500 AL SNB
- 1 ea Wall Stop 416 626
- 1 set Gasket S88D17

HW4

- 3 ea Hinges TA2714 26D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML20557VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Overhead Stop 9-336 630
- 1 set Gasket S88D17

HW4a

- 3 ea Hinges T4A3786 26D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML20557VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Overhead Stop 9-436 630
- 1 set Gasket S88D20

HW5

- 2 ea Continuous Hinge SL11 CLHD 83
- 2 ea Exit Device ED5470 630 M52 M54 M55 M110 CLS6
- 1 ea Pull Trim TH957 630 CLS6
- 1 ea Pull Trim TH950 630
- 3 ea Temp Green Const Core
- 3 ea Perm Core 3840-25-1006
- 2 ea Closer/Holder CLP7500T AL SNB
- 2 ea Wall Stop 416 626
- 1 set Gasket S88D20

HW6

- 2 ea Continuous Hinge SL11 CLHD 83
- 1 ea Mullion SL60K AL
- 2 ea Exit Device ED5200S 630 M52 M54 M110 CLS6
- 1 ea Pull Trim TH957 630 CLS6
- 1 ea Pull Trim TH950 630
- 4 ea Temp Green Const Core
- 4 ea Perm Core 3840-25-1006
- 2 ea Closer/Stop UNI7500 AL SNB
- 1 ea Threshold 273X4AFG 72 x Pemkote
- 2 ea Sweep 345AV 36
- 1 ea Drip Cap 346C 40
- Weatherstrip by door mfr

HW7

- 2 ea Continuous Hinge SL11 CLHD 83
- 2 ea Flushbolt 555 626
- 1 ea Dustproof Strike 570 626
- 1 ea Lockset ML20557VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Closer CLP7500T AL SNB (act leaf)

- 2 ea Wall Stop 416 626
- 4 ea Silencers 4279

HW8

- 1 ea Cylinder Housing 408 626 x cam
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- Balance of hardware by door mfr

HW9

- 3 ea Hinges TA2714 26D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML2057VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Wall Stop 416 626
- 1 ea Threshold 1715AK 36
- 1 ea Sweep 345AV 36
- 1 ea Drip Cap 346C 40
- 1 set Gasket S88D17

HW9a

- 3 ea Hinges T4A3786 26D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML2057VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Wall Stop 416 626
- 1 ea Threshold 1715AK 42
- 1 ea Sweep 345AV 42
- 1 ea Drip Cap 346C 46
- 1 set Gasket S88D20

HW10

- 3 ea Hinges TA2314 32D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML2057VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Overhead Stop 9-336 630
- 1 ea Threshold 1715AK 36
- 1 ea Sweep 345AV 36
- 1 ea Drip Cap 346C 40

1 set Gasket S88D17

HW11

1 ea Continuous Hinge SL11 CLHD 83
1 ea Lockset ML2055VR NSV 630 CLS6
1 ea Temp Green Const Core
1 ea Perm Core 3840-25-1006
1 ea Wall Stop 416 626
1 ea Threshold 1715AK 36
1 ea Sweep 345AV 36
1 ea Drip Cap 346C 40
Weatherstrip by door mfr

HW12

4 ea Hinges TA2714 26D 4 1/2 x 4 1/2 NRP
1 ea Flushbolt 555 626 (top only)
1 ea Lockset ML2057VR NSV 630 CLS6 x 7/8 STK
1 ea Temp Green Const Core
1 ea Perm Core 3840-25-1006
2 ea Overhead Stop 9-336 630
1 ea Threshold 1715AK 72
2 ea Sweep 345AV 36
1 ea Drip Cap 346C 76
1 set Gasket S88D30
1 ea Astragal 357SP 48

HW13

1 ea Continuous Hinge SL11 CLHD 83
1 ea Exit Device ED5200S 630 M52 M54 M110 CLS6
1 ea Pull Trim TH957 630 CLS6
2 ea Temp Green Const Core
2 ea Perm Core 3840-25-1006
1 ea Closer/Stop UNI7500 AL SNB
1 ea Threshold 273X4AFG 36 x Pemkote
1 ea Sweep 345AV 36
1 ea Drip Cap 346C 40
1 set Gasket S88D17

HW14

1 ea Continuous Hinge SL11 CLHD 83
1 ea Exit Device ED5200S 630 M52 M54 M110 CLS6 48
1 ea Pull Trim TH957 630 CLS6
2 ea Temp Green Const Core
2 ea Perm Core 3840-25-1006
1 ea Closer CLP7500T AL SNB
1 ea Wall Stop 416 626

1 set Gasket S88D20

HW15

3 ea Hinges TA2714 26D 4 1/2 x 4 1/2 NRP
1 ea Lockset ML2022VR NSV 630 CLS6
2 ea Temp Green Const Core
2 ea Perm Core 3840-25-1006
1 ea Closer PR7500 AL SNB
1 ea Wall Stop 416 626
1 set Gasket S88D17

HW16

1 ea Continuous Hinge SL11 CLHD 83
1 ea Lockset ML2057VR NSV 630 CLS6
1 ea Temp Green Const Core
1 ea Perm Core 3840-25-1006
1 ea Closer/Stop/Holder UNI7500H AL SNB
1 ea Threshold 1715AK 36
1 ea Sweep 345AV 36
1 ea Drip Cap 346C 40
Weatherstrip by door mfr

HW17

3 ea Hinges TA2314 32D 4 1/2 x 4 1/2 NRP
1 ea Lockset ML2057VR NSV 630 CLS6
1 ea Temp Green Const Core
1 ea Perm Core 3840-25-1006
1 ea Closer/Stop UNI7500 AL SNB
1 ea Threshold 1715AK 36
1 ea Sweep 345AV 36
1 ea Drip Cap 346C 40
1 set Gasket S88D17

HW17a

2 ea Hinges TA2314 32D 4 1/2 4 1/2 NRP
1 ea Lockset ML2057VR NSV 630 CLS6
1 ea Temp Green Const Core
1 ea Perm Core 3840-25-1006
1 ea Closer/Stop UNI7500 AL SNB
1 ea Threshold 1715AK 36
1 ea Sweep 345AV 36
1 ea Drip Cap 346C 40

- 1 set Gasket S88D17

HW18

- 6 ea Hinges TA2314 32D 4 1/2 x 4 1/2 NRP
- 1 ea Flushbolt 555 626 (top only)
- 1 ea Lockset ML2057VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- Safety barrier chains by others

HW19

- 3 ea Hinges TA2714 26D 4 1/2 x 4 1/2 NRP
- 1 ea Latchset ML2010VR NSV 630
- 1 ea Wall Stop 416 626
- 1 set Gasket S88D17

HW20

- 1 ea Continuous Hinge SL11 CLHD 83
- 1 ea Deadbolt DL3017 626 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 set Push/Pulls 110 x 73C/73CL 630
- 1 ea Closer/Stop UNI7500 AL SNB
- 1 ea Threshold 1715AK 36
- 1 ea Sweep 345AV 36
- 1 ea Drip Cap 346C 40
- 1 set Gasket S88D17

HW21

- 3 ea Hinges TA2714 26D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML2065 NSA 630 M19VN CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Closer 7500 AL SNB
- 1 ea Threshold 1715AK 36
- 1 ea Sweep 345AV 36
- 1 ea Drip Cap 346C 40
- 1 set Gasket S88D17

HW22

- 3 ea Hinges TA2314 32D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML2057VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Closer/Stop UNI7500 AL SNB
- 1 ea Threshold 1715AK 36
- 1 ea Sweep 345AV 36
- 1 ea Drip Cap 346C 40
- 1 set Gasket S88D17

HW23

- 3 ea Hinges TA2714 26D 4 1/2 x 4 1/2 NRP
- 1 ea Lockset ML2057VR NSV 630 CLS6
- 1 ea Temp Green Const Core
- 1 ea Perm Core 3840-25-1006
- 1 ea Overhead Stop 9-336 630
- 3 ea Silencers 4279

End of Section 08 71 00

SECTION 08 80 00 – GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes glazing & mirrors for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows.
 - 2. Exterior and Interior Doors.
 - 3. Interior borrowed lites.
 - 4. Glazed storefront and window systems.
- B. Related Sections include the following:
 - 1. Division 08 Sections for Doors and Frames for relites/side lites.
 - 2. Division 08 Sections for Aluminum-Framed Storefront coordination.
- C. Performance Requirements:
 - 1. Glass and glazing materials of this Section shall provide continuity of building enclosure vapor and air barrier:
 - a. In conjunction with materials described in other sections of Division 07 and Division 08
 - b. To utilize the inner pane of multiple pane sealed units for the continuity of the air and vapor seal
 - c. Maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of glazing sealant
 - 2. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass as calculated in accordance with IBC requirements and the design criteria contained within the construction documents
 - 3. All glazing shall be type and quality as required to meet UBC requirements for safety glazing. Provide labeling required as per IBC requirements

1.2 REFERENCES

- A. ASTM E 330 - Test method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- B. ANSI Z97.1- Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
- C. ASTM C 1036 - Specification for Flat Glass.
- D. ASTM C 1048 - Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
- E. ASTM E 546 - Test Method For Frost Point of Sealed Insulating Glass Units.
- F. ASTM E 576 - Test Method For Frost Point of Sealed Insulating Glass Units in Vertical Position.
- G. ASTM E 773 - Test Methods for Seal Durability of Sealed Insulating Glass Units.
- H. ASTM E 774 - Specification for Sealed Insulating Glass Units.
- I. FGMA - Glazing Manual.
- J. FGMA - Sealant Manual.
- K. Laminator Safety Glass Association - Standards Manual.
- L. SIGMA - Sealed Insulated Glass Manufacturers Association.
- M. CPSC 16 CFR 1201

1.3 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Manufacturer's Certificate: Certify that sealed insulated glass, meet or exceed specified requirements.

- E. Submit drawings indicating required backing for mirrors

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with FGMA Glazing Manual, FGMA Sealant Manual, SIGMA and Laminator Safety Glass Association - Standards Manual for glazing installation methods.
- B. Glazing Publications: Comply with the following published recommendations for Mirrors
 - 1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
 - 2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- C. Fire Rated Glass Assemblies: Conform to ASTM E119.

1.5 PROJECT/SITE CONDITIONS

- A. Field Measurements
 - 1. Verify that field measurements are as indicated on shop Drawings.

1.6 SEQUENCING AND SCHEDULING

- A. Coordination
 - 1. Coordinate the Work with glazing frames, wall openings, and perimeter air and vapor seal to adjacent Work.

1.7 EXTENDED WARRANTY

- A. Under provisions of Division 01
- B. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- D. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Basis-of-Design Product: The design for each glazing product is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
 - 1. Ultra-Clear (Low-Iron) Float Glass: Class I (clear); with a minimum 91 percent visible light transmission and a minimum solar heat gain coefficient of 0.87.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements".
 2. For uncoated glass, comply with requirements for Condition A.
 3. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 4. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- C. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:
1. Interlayer: Polyvinyl butyral or cured resin of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 - a. For polyvinyl butyral interlayers, laminate lites in autoclave with heat plus pressure.
 - b. For cured-resin interlayers, laminate lites with laminated-glass manufacturer's standard cast-in-place and cured-transparent-resin interlayer.
 2. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.
- D. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
 3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 4. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - a. Manufacturer's standard sealants.
 - b. Polyisobutylene and silicone.
 5. Spacer Specifications: Manufacturer's standard spacer material and construction.

2.3 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
1. EPDM, ASTM C 864.
 2. Silicone, ASTM C 1115.
 3. Thermoplastic polyolefin rubber, ASTM C 1115.
 4. Any material indicated above.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
1. EPDM.
 2. Silicone.
 3. Thermoplastic polyolefin rubber.
 4. Any material indicated above.
- C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.4 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 4. Colors of Exposed Glazing Sealants: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].
- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. Neutral-Curing Silicone Glazing Sealants GS-<#>:
 - a. Available Products:
 - 1) Dow Corning Corporation; 791.
 - 2) Dow Corning Corporation; 795.
 - 3) GE Silicones; SilPruf NB SCS9000.
 - 4) GE Silicones; UltraPruf II SCS2900.
 - 5) Pecora Corporation; 865.
 - 6) Pecora Corporation; 895.
 - 7) Pecora Corporation; 898.
 - b. Type and Grade: S (single component) and NS (nonsag).
 - c. Class: 50.
 - d. Use Related to Exposure: NT (nontraffic).
 - e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
 - 1) Use O Glazing Substrates: Coated glass color anodic aluminum, aluminum coated with a high-performance coating galvanized steel.

2.5 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
1. Type 1, for glazing applications in which tape acts as the primary sealant.
 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.7 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.
- C. Grind smooth and polish exposed glass edges and corners.
- D. Bullet-Resisting Glass:
 - 1. Comply with UL 752.
 - 2. Laminate glass with laminating film by manufacturer's standard heat and pressure process.
 - 3. Cut glass to required size at factory. Treat edges to prevent moisture intrusion. Coordinate speak-thru void where shown.
 - 4. Discard glass with voids, delamination, or entrapped dirt or foreign matter.

2.8 GLASS PRODUCTS

- A. Available Manufacturers:
 - 1. Basis of Design: Vitro Architectural Glass, formerly PPG Industries Inc.
 - 2. Libby-Owens-Ford Company
 - 3. Pilkington
 - 4. Saint Gobain Glass
 - 5. Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products
- B. See drawings for locations where glazing types G# (specified below) are indicated
- C. **G1S-** Insulated Tinted Glazing Units, safety rated for locations subject to impact
 - 1. Solar-Control Low-E Insulating-Glass Units: Vitro **Solarban 60 (2) Clear + Clear**
 - 2. Overall Unit Thickness and Thickness of Each Lite: 1" overall, with two ¼" nominal layers of glass with ½" air space between.
 - 3. Interspace Content: Air.
 - 4. Outdoor Lite: Class 1 (clear).
 - a. Kind FT (fully tempered) where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with system performance requirements
 - b. Color: **Clear**
 - 5. Indoor Lite: Class 1 (clear) float glass.
 - a. Kind FT (fully tempered)
 - 6. Low-E Coating: sputtered on second surface.
 - 7. Visible Light Transmittance: **70 percent minimum.**
 - 8. Winter Nighttime U-Factor: **.29 maximum.**
 - 9. Summer Daytime U-Factor: **.27 maximum.**
 - 10. Solar Heat Gain Coefficient: **.39 maximum.**
 - 11. Shading Coefficient: **0.45**
- D. **G2S-** Clear Glazing, safety rated for locations subject to impact
 - 1. Uncoated Clear Float-Glass Units: Class 1 (clear) float glass Kind FT (fully tempered) float glass - Tempered: Pilkington Optifloat Clear (single glazed for interior installation)
 - 2. Thickness: 6.0 mm.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

2. Presence and functioning of weep system.
 3. Minimum required face or edge clearances.
 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 PREPARATION
- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- 3.3 GLAZING, GENERAL
- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than **50 inches (1270 mm)** as follows:
1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 2. Provide **1/8-inch** minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
- 3.4 TAPE GLAZING
- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.

- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
 - H. Apply cap bead of elastomeric sealant over exposed edge of tape.
- 3.5 GASKET GLAZING (DRY)
- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
 - B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
 - C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 - D. Install gaskets so they protrude past face of glazing stops.
- 3.6 SEALANT GLAZING (WET)
- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
 - B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
 - C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
- 3.7 CLEANING AND PROTECTION
- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
 - B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
 - C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
 - D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
 - E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.
 - F. Protect mirrors from breakage and contaminating substances resulting from construction operations.
 - G. Do not permit edges of mirrors to be exposed to standing water.
 - H. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

END OF SECTION 08 80 00

DIVISION 09 – FINISHES

| | | |
|-------------------|--------------------------------------|---|
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| ROOM | ROOM | FLOOR | BASE | N. WALL | | E. WALL | | S. WALL | | W. WALL | | CEILING | | REMARKS |
|----------------------|-------------------|--------|--------|---------|-------------------|---------|-------------|---------|-------------------|---------|------------|---------|--------|--|
| No. | Name | Finish | Matl | Matl | Finish | Matl | Finish | Matl | Finish | Matl | Finish | Matl | Finish | |
| LOCKER ROOM BUILDING | | | | | | | | | | | | | | |
| 101 | Vestibule | WALK | RB-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | GB | PT-1 | SC-2 | FF | |
| 101 | Locker Room 1A | RT-1 | RB-1 | CMU | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | SC-1 | FF | SEE INTERIOR ELEVATIONS FOR ACCENT PAINT LOCATIONS |
| 101A | Coach Office | RT-1 | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | SC-2 | FF | |
| 101B | Restroom | TILE-1 | TILE-2 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | SC-2 | FF | |
| 101C | Custodial | SC | RB-1 | CMU/GB | PT-1 | GB | PT-1 | CMU/GB | PT-1 | GB | PT-1 | SC-1 | FF | |
| 101D | Storage | SC | RB-1 | CMU | PT-1 | GB | PT-1 | CMU/GB | PT-1 | GB | PT-1 | SC-1 | FF | |
| 101E | Storage | SC | RB-1 | CMU | PT-1 | GB | PT-1 | CMU/GB | PT-1 | GB | PT-1 | SC-1 | FF | |
| 101F | Showers | TILE-1 | TILE-2 | GB | PT-2/TILE-2/FRL-1 | GB | PT-2/TILE-2 | GB | PT-2/TILE-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2 | |
| 101G | Restroom | TILE-1 | TILE-2 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2 | |
| 102 | Vestibule | WALK | RB-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | GB | PT-1 | SC-2 | FF | |
| 102 | Locker Room 1B | RT-1 | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | SC-1 | FF | SEE INTERIOR ELEVATIONS FOR ACCENT PAINT LOCATIONS |
| 102A | Storage | SC | RB-1 | CMU | PT-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | SC-1 | FF | |
| 102B | Showers | TILE-1 | TILE-2 | GB | PT-2/TILE-2/FRL-1 | GB | PT-2/TILE-2 | GB | PT-2/TILE-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2 | |
| 102C | Restroom | TILE-1 | TILE-2 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2 | |
| 103 | Training Room | RT-1 | RB-1 | GB | PT-1/FRL-1 | CMU | PT-1/FRL-1 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | SC-1 | FF | |
| 104 | Vestibule | WALK | RB-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | GB | PT-1 | SC-2 | FF | |
| 104 | Locker Room 2A | RT-1 | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | SC-1 | FF | SEE INTERIOR ELEVATIONS FOR ACCENT PAINT LOCATIONS |
| 104A | Coach Office | RT-1 | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | SC-2 | FF | |
| 104B | Restroom | TILE-1 | TILE-2 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | SC-2 | FF | |
| 104C | Custodial | SC | RB-1 | CMU | PT-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | SC-1 | FF | |
| 104D | Showers | TILE-1 | TILE-2 | GB | PT-2/TILE-2/FRL-1 | GB | PT-2/TILE-2 | GB | PT-2/TILE-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2 | |
| 104E | Restroom | TILE-1 | TILE-2 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2 | |
| 104F | Storage | SC | RB-1 | GB | PT-1 | CMU | PT-1 | CMU/GB | PT-1 | GB | PT-1 | GB | PT-1 | |
| 105 | Vestibule | WALK | RB-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | GB | PT-1 | SC-2 | FF | |
| 105 | Locker Room 2B | RT-1 | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | SC-1 | FF | SEE INTERIOR ELEVATIONS FOR ACCENT PAINT LOCATIONS |
| 105A | Custodial | SC | RB-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | |
| 105B | Showers | TILE-1 | TILE-2 | GB | PT-2/TILE-2/FRL-1 | GB | PT-2/TILE-2 | GB | PT-2/TILE-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2 | |
| 105C | Restroom | TILE-1 | TILE-2 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2/FRL-1 | GB | PT-2 | |
| 106 | Field Storage | SC | RB-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | GB | PT-1 | NC | PT-1 | |
| 107A | Sales | SC | RB-1 | GB | PT-1 | CMU | PT-1 | CMU | PT-1 | GB | PT-1 | SC-2 | FF | |
| 107B | Storage | SC | RB-1 | GB | PT-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | SC-2 | FF | |
| 108 | Mechanical | SC | RB-1 | GB | PT-1 | GB | PT-1 | CMU | PT-1 | GB | PT-1 | NC | PT-1 | |
| 109 | Electrical/MDF | SC | RB-1 | GB | PT-1 | GB | PT-1 | CMU | PT-1 | CMU | PT-1 | SC-2 | FF | |
| 110 | Referee Women | TILE-1 | TILE-2 | CMU | PT-1/FRL-1 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | SC-1 | FF | |
| 111 | Referee Men | TILE-1 | TILE-2 | CMU | PT-1/FRL-1 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | GB | PT-1/FRL-1 | SC-1 | FF | |
| 112 | Tunnel #3 | CONC | - | CMU | PT-5 | CMU | PT-5 | CMU | PT-5 | - | - | MTL | FF | |
| 113 | Storage | CONC | - | CMU | PT-1 | GB | PT-1 | CMU | PT-1 | CMU | PT-1 | NC | - | |
| 114 | Storage | CONC | - | CMU | PT-1 | GB | PT-1 | CMU | PT-1 | CMU | PT-1 | NC | - | |
| 115 | Storage | CONC | - | CMU | PT-1 | GB | PT-1 | CMU | PT-1 | CMU | PT-1 | NC | - | |
| 116 | Storage | CONC | - | CMU | PT-1 | GB | PT-1 | CMU | PT-1 | CMU | PT-1 | NC | - | |
| 117 | Tunnel #2 | RT-1 | RB-1 | GB | PT-1 | GB | PT-1 | CMU | PT-1 | CMU | PT-1 | SC-1 | FF | |
| 118 | Storage | CONC | - | CMU | PT-1 | GB | PT-1 | CMU | PT-1 | CMU | PT-1 | N C | - | |
| 119 | Storage | CONC | - | CMU | PT-1 | GB | PT-1 | CMU | PT-1 | CMU | PT-1 | NC | - | |
| 120 | Tunnel #1 | CONC | - | CMU | PT-5 | CMU | PT-5 | CMU | PT-5 | - | - | - | - | |
| 121 | Stadium Storage | CONC | - | CMU | PT-1 | CMU | PT-1 | GB | PT-1 | CMU | PT-1 | NC | - | |
| 122 | Equipment Storage | CONC | - | CMU | PT-1 | CMU | PT-1 | GB | PT-1 | GB | PT-1 | NC | - | |
| 123 | Laundry | CONC | - | GB | PT-2 | CMU | PT-2 | GB | PT-2 | GB | PT-2 | GB | PT-2 | |
| 124 | Roof Access | CONC | - | GB | PT-1 | CMU | PT-1 | GB | PT-1 | GB | PT-1 | NC | PT-1 | |
| | | | | | | | | | | | | | | |
| Press Box | | | | | | | | | | | | | | |
| 301 | Press Box | RT-2 | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | NC | PT-1 | |
| 302 | Press Box | RT-2 | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | NC | PT-1 | |
| 303 | Press Box | RT-2 | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | NC | PT-1 | |
| | | | | | | | | | | | | | | |

| ROOM | ROOM | FLOOR | BASE | N. WALL | | E. WALL | | S. WALL | | W. WALL | | CEILING | | REMARKS |
|-------------------|---------------------------|-----------------------|---------------------------|---------|--|---------|------------------------------|---------|------------|----------|--------------------------------------|---------|--------|---------|
| No. | Name | Finish | Matl | Matl | Finish | Matl | Finish | Matl | Finish | Matl | Finish | Matl | Finish | |
| | | | | | | | | | | | | | | |
| TICKET BUILDING | | | | | | | | | | | | | | |
| 100 | Ticket | SC | RB-1 | GB | PT-4 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | |
| 101A | Women's Restroom | SC | 6" RB-1 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1 | |
| 101B | Women's Restroom | SC | 6" RB-1 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1 | |
| 102 | Men's Restroom | SC | 6" RB-1 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1 | |
| 103 | Electrical | SC | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | |
| 104 | Restroom | SC | 6" RB-1 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1/FRL-2 | GB | PT-1 | |
| 105 | Custodial | SC | 6" RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | |
| 106 | Storage | SC | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | |
| 107 | Storage | SC | RB-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | GB | PT-1 | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| ABBREVIATIONS KEY | | | | | | | | | | | | | | |
| ACT | Acoustical Ceiling Tile | HPC | Honed & Polished Concrete | | | RB | Rubber Base | | | RT | Rubber Tile | | | |
| CMU | Concrete Masonry Unit | NA | Not Applicable | | | WALK | Walk Off Matt Tile Carpeting | | | VCT | Vinyl Composite Tile | | | |
| CONC | Concrete | NF | No Finish | | | VWC | Vinyl Wall Covering | | | SV | Sheet Vinyl | | | |
| CPT | Carpet | PT | Paint | | | TILE | Tile | | | AF | Access Floor | | | |
| FF | Factory Finsih | PLAM | Plastic Laminate | | | STL | Steel | | | AB | Aluminum Base | | | |
| FRP | Fiber Reinforced Plastic | QT | Quarry Tile | | | PFS | Painted floor Sealer | | | RS | Rubber Stair Tread, Riser & Stringer | | | |
| GB | Gypsum Board | SC | Sealed Concrete | | | NC | No Ceiling | | | AL | Aluminum Base | | | |
| SC | Acoustical Suspended Cing | WD | Wood | | | MDF | Medium Density Fiberboard | | | CONC TOP | Self Leveling Concrete Topping | | | |
| | | | | | | | | | | | | | | |
| | | General Finish Notes: | | 1 | Install FRL in 4' wide sections unless noted otherwise | | | | | | | | | |
| | | | | 2 | Install water resistant backer board at plumbing fixture locations. | | | | | | | | | |
| | | | | 3 | Reference sheets A3.41 - A3.42 for Floor Finishes layout. | | | | | | | | | |
| | | | | 4 | Install solid wood blocking/backing at all wall hung equipment prior to gypsum board installation. | | | | | | | | | |
| | | | | 5 | Some toilet accessories to be OFCI. Reference specification 10 28 00. | | | | | | | | | |
| | | | | 6 | RB-1 to be 4" tall unless noted otherwise | | | | | | | | | |

Reference ABBREVIATION KEY above in Finish Schedule

| Spec. | Section/Item | Reference | Mfgr./Product | Finish Color | Remarks |
|--|---|-----------|---|--|-----------------------|
| Div. 3 Concrete | | | | | |
| 03 30 00 | Cast-in-Place Concrete | SC | Sherwin Williams, Armorseal 1000 | Clear | |
| 03 45 00 | Precast Architectural Concrete | - | - | Acid Etch Finish | Wall Cap, Wall Panels |
| Div. 4 Masonry | | | | | |
| 04 21 00 | Brick Masonry Veneer System | - | Mutual Materials - Mission Texture 3-5/8" X 2-1/4" X 7-5/8" | Color - Forrest Blend Mortar - Gray | Veneer |
| 04 22 00 | Unit Masonry Assemblies | - | Western Materials | Standard Gray Units | |
| Div. 5 Metals | | | | | |
| 05 12 00 | Structural Steel | - | None | Paint Exposed Steel - see division 09 below | |
| 05 30 00 | Metal Decking | - | See Paint Colors - Finish Schedule | Paint Exposed Deck - see division 09 below | |
| 05 50 00 | Metal Fabrications | - | See Paint Colors - Finish Schedule | Paint Exposed Steel Fabrications - see division 09 below | |
| 05 51 36 | Aluminum Platform | - | None | Mill Aluminum Finish | |
| 05 52 00 | Metal Railings | - | See Paint Colors - Finish Schedule | Paint Exposed Steel - see division 09 below | |
| Div. 6 Wood and Plastics | | | | | |
| 06 40 23 | Interior Architectural Woodwork | | | | |
| | Cabinets (vertical surfaces) | PLAM-1 | Wilsonart Laminate | Dove Grey D92-60 Matte Finish | |
| | Countertop & edge (horizontal surfaces) | PLAM-2 | Wilsonart Laminate | Carbon Mesh 4880-38 Fine Velvet Finish | |
| | Countertop & edge (horizontal surfaces) | SS | Approved Mnfr List | Stainless Steel Countertop | |
| | Edge Banding | PVC | Approved Mnfr List | PVC - Color TBD | |
| Div.7 Thermal & Moisture Protection | | | | | |
| 07 11 13 | Bituminous Dampproofing | - | Approved Manufacturer List | Black | |
| 07 18 13 | Pedestrian Traffic Coatings | - | Approved Manufacturer List | Color TBD from Mfr's Standard Colors | |
| 07 24 00 | EIFS | - | Parex | Color TBD from Mfr's Standard Colors | |
| 07 42 13 | Metal Wall Panels | - | AEP Span, Cool Dura Tech mx | ZACtique II | Vertical |
| 07 42 93 | Metal Soffit Panels | - | AEP Span, Dura Tech 5000 | Cool Zinc Gray | |
| 07 54 00 | Thermoplastic Polyolefin (TPO) Roofing | - | Carlisle SynTec SureWeld | White | |
| 07 61 13 | Standing Seam Metal Roofing | - | AEP-Span, Dura Tech 5000 | Cool Zinc Gray | Roofing & Fascia |
| 07 62 00 | Sheet Metal Flashing and Trim | - | | | |
| | Precast Concrete Flashing | - | AEP Span, Dura Tech 5000 | Cool Zinc Gray | |
| | Metal Wall Panel Flashing | - | AEP Span, Cool Dura Tech mx | ZACtique II | |
| | Gutters and Downspouts | - | AEP Span Dura Tech 5000 | Cool Zinc Gray | |
| | Parapet Cap Flashing | - | AEP Span Dura Tech 5000 | Cool Zinc Gray | |
| 07 72 00 | Roof Accessories | - | Bilco, Roof Hatches | Paint PT-7 See division 09 below | |
| 07 92 00 | Joint Sealants | - | See Sealant Requirements - Various Mnfr | Match adjacent material color being sealed | |

Reference ABBREVIATION KEY above in Finish Schedule

| Spec. | Section/Item | Reference | Mfgr./Product | Finish Color | Remarks |
|---------------|---------------------------------------|-----------|---|--|--|
| Div. 8 | Doors and Windows | | | | |
| 08 11 13 | Hollow Metal Doors and Frames | - | Ceco Door Products | Prime finish for field paint - see Division 09 | |
| 08 17 00 | FRP Flush Doors | FRP | Specialite | Light Gray - Sandstone Texture | |
| 08 31 13 | Access Doors and Frames | - | Approved Manufacturer List | Shop primed for field painting, match adjacent finish | |
| 08 33 13 | Coiling Counter Doors | OCD | Cookson | Stainless Steel | |
| 08 33 23 | Coiling Doors | OHD | Cookson | Stainless Steel or Aluminum as specified ini 08 33 23 | |
| 08 41 13 | Aluminum Window Systems | | Kawneer TR-9100 Windows | Clear anodized finish | |
| 08 71 00 | Door Hardware | - | See Hardware Requirements - Various Mnfr | | |
| 08 80 00 | Glazing | | | | |
| | Insulated Glazing (safety) | G1S | Vitro Solarban 60 (2) Clear + Clear | Clear | 1 inch assembly |
| | Clear Glazing (safety) | G2S | Pilkington Optifloat | Clear | 6 mm |
| Div. 9 | Finishes | | | | |
| 09 29 00 | Gypsum board assemblies | - | None | Typical finish - Level 4, fine orange peel. Level 4 smooth at vinyl wallcoverings. | |
| 09 30 00 | Tiling | | | | |
| | Porcelain Tile (floor) | TILE-1 | Daltile, Portfolio, 2x2, Schluter Cove Transition - Brushed Stainless Steel | Suede Gray (2) D182 | Grout: #78 Sterling Silver (Laticrete) |
| | Porcelain Tile (wall) | TILE-2 | Daltile, Portfolio, 2x4 | Desert Gray (1) D014 | Grout: #78 Sterling Silver (Laticrete) |
| 09 51 23 | Acoustical Panel Ceilings | | | | |
| | Acoustical Suspended Ceiling | SC-1 | Armstrong, Kitchen Zone 672 | White - 2'x4'x5/8" | Square Lay-in |
| | Acoustical Suspended Ceiling | SC-2 | Armstrong, Fine Fissured School Zone | White - 2'x4'x3/4" | Square Lay-in |
| 09 65 13 | Resilient Base and Accessories | | | | |
| | Rubber Base | RB-1 | Tarkett Rubber Wall Base | 48 Grey WG | |
| | Resilient Molding Accessories | - | Tarkett Transition | 48 Grey WG | Verify required profile with adjacent flooring types |
| 09 65 19 | Resilient Tile Flooring | | | | |
| | | RT-1 | Tarkett Inertia - Speckled | LC7 Best Seller | |
| | | RT-2 | Tarkett Microtone - Speckled | HNSP-LC2 City Block CG | |
| 09 68 13 | Walk Off Mat Tile Carpeting | WALK | Mannington Commercial - Force, 18"x36" | Color: Kinetic 11360 | Horizontal Brick Ashlar Installation Pattern |
| 09 77 00 | Plastic Wall Paneling | FRL-1 | Nudo Allure Wall Panel | WilsonArt Laminate - D92-60 Dove Grey | |
| | Fiber-Reinforced Laminate | FRL-2 | Nudo FiberLite FRP | Medium Gray, Pebbled Texture | |
| 09 91 00 | Painting | | | | |
| | Standard Paint (Interior) | PT-1 | Sherwin Williams | TBD | Standard Color |
| | Standard Paint (Epoxy) | PT-2 | Sherwin Williams | Epoxy Paint - Color to Match PT-1 | Wet Areas |
| | Accent Paint (Interior) | PT-3 | Sherwin Williams | TBD | Door Frames |
| | Accent Paint (Int/Ext, Steel, Frames) | PT-4 | Sherwin Williams | TBD | Interior Accent Color |
| | Standard Paint (Exterior) | PT-5 | Sherwin Williams | TBD | Main Body Color |
| | Accent Paint (Exterior) | PT-6 | Sherwin Williams | TBD | Middle Accent Band, Steel Rail |
| | Accent Paint (Exterior) | PT-7 | Sherwin Williams | TBD | Top Accent Band |
| | Accent Paint (Exterior) | PT-8 | Sherwin Williams | TBD | Steel Cross Bracing |

Reference ABBREVIATION KEY above in Finish Schedule

| Spec. | Section/Item | Reference | Mfgr./Product | Finish Color | Remarks |
|----------------------------|---|--------------------------------------|--|--|---------|
| Div. 10 Specialties | | | | | |
| 10 11 16 | Visual Display Liquid Marker Board | - | Claridge | White | |
| 10 11 23 | Vinyl Faced Tackboards | - | Koroseal, Lino | Stonewash LN21-57 | |
| 10 14 00 | Signage Panel Signs Cut/Cast Metal Signs | - - - | Approved Manufacturer List Approved Manufacturer List | TBD - Color to be selected from full standard color range Aluminum | |
| 10 21 13 | Toilet Compartments | - | Scranton Products | Grey | |
| 10 26 13 | Corner Guards | - | - | Stainless Steel | |
| 10 28 00 | Toilet, Bath and Health Care Accessories Toilet Tissue (Roll) Dispenser Paper Towel Dispenser Soap Dispenser Sanitary-Napkin Disposal Units Grab Bar Mirror Unit Robe Hook Mop Rack | - - - - - - - - | OFCI OFCI OFCI OFCI Bobrick Bobrick Bobrick Bobrick | Stainless Steel Stainless Steel Stainless Steel Stainless Steel | |
| 10 41 16 | Emergency Key Cabinets | - | Knox-Box 3200-R | Color: Anodized Aluminum | |
| 10 44 00 | Fire Extinguishers & Cabinets | | J. L. Industries | White | |
| 10 51 13 | Metal Lockers | - | DeBourgh Mfg, Corregidor | TBD - Colors to be selected from full standard color range | |
| Div. 11 Equipment | | | | | |
| 11 30 13 | Residential Appliances | - | Washer & Dryer | Stainless Steel | |
| Div. 12 Furnishings | | | | | |
| 12 21 13 | Louver Blinds | - | Levolor Corded Mark I DustGuard 1" | TBD - Color to be selected from full standard color range | |
| 12 93 00 | Site Furnishings | - | - | As Specified in 12 93 00 | |

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.
 - 3. Taped and sanded joint treatment.
 - 4. Texture finish.
 - 5. Installation of acoustical sealant specified in Section 07 92 00, at sound rated walls.
 - 6. Installation of access doors specified in Section 08 31 13.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for wood framing and furring that supports gypsum board.
 - 2. Division 07 Section "Thermal Insulation" for insulation and vapor retarders installed in assemblies that incorporate gypsum board.
 - 3. Division 09 Section "Tiling" for cementitious backer units installed as substrates for ceramic tile.
 - 4. Division 09 painting Sections for primers applied to gypsum board surfaces.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Provide certification that all drywall materials to be incorporated into the project are manufactured in the USA.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
 - 2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.3 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Mockups: Before beginning gypsum board installation, install mockups of at least 50 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - b. Each texture finish indicated.
 - 2. Apply or install final decoration indicated, including painting, on exposed surfaces for review of mockups.
 - 3. Simulate finished lighting conditions for review of mockups.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. General: Complying with ASTM C 36 or ASTM C 1396, as applicable to type of gypsum board indicated and whichever is more stringent.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. National Gypsum Company – basis of design
 - 2. American Gypsum Co. – products equal to basis of design
 - 3. BPB America Inc. – products equal to basis of design
 - 4. Certainteed – products equal to basis of design
 - 5. G-P Gypsum – products equal to basis of design
 - 6. Lafarge North America Inc. – products equal to basis of design
 - 7. PABCO Gypsum – products equal to basis of design
 - 8. USG Corporation – products equal to basis of design
- D. All drywall materials incorporated into the project shall be manufactured in the USA.

2.2 FIRE-RESISTANCE RATED GYPSUM BOARD: Use in all locations unless noted otherwise in specifications or drawings.

- A. Basis of Design: Gold Bond® BRAND Fire-Shield® Gypsum Board
 - 1. Type X, Panel Physical Characteristics
 - a. Core: Fire-resistance rated gypsum core
 - b. Surface paper: 100 percent recycled content paper on front, back and long edges
 - c. Long Edges: **Tapered**
 - d. Overall thickness: 5/8 inch
 - e. Panel complies with Type X requirements of ASTM C 1396

2.3 FIRE-RESISTANCE RATED GYPSUM BOARD WITH ENHANCED MOLD AND MILDEW RESISTANCE; use in Restrooms, Janitor Closets or locations within 6'-0" of the centerline of any plumbing fixture.

- A. Basis of Design: Gold Bond® BRAND XP® Fire-Shield® Gypsum Board
 - 1. Type X, Panel Physical Characteristics
 - a. Core: Mold and moisture resistant, fire-resistance rated gypsum core
 - b. Surface paper: 100 percent recycled content moisture/mold/mildew resistant paper on front, back and long edges
 - c. Long Edges: **Tapered**
 - d. Overall thickness: 5/8 inch
 - e. Panel complies with Type X requirements of ASTM C 1396
 - f. Mold/Mildew Resistance: 10 when tested in accordance with ASTM D 3273

2.4 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board or Cementitious Backer Units: ANSI A118.9. Install in lieu of gypsum wall board panels at all ceramic wall tile installation substrates. Install 24 inches in height continuously at all ceramic wall tile base locations.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. G-P Gypsum : "DensShield Tile Guard"

- b. Custom Building Products; Wonderboard.
 - c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - d. USG Corporation; DUROCK Cement Board.
2. Thickness: 5/8 inch.

2.5 TRIM ACCESSORIES

- A. Aluminum Trim: Extruded accessories of profiles and dimensions indicated. At all locations calling out for Control Joints in interior elevation drawings of gypsum board walls, the product for this joint shall be:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Basis of Design: Standard Single-V Metal Expansion Joint. Reference Drawings.
 - 1) Fry Reglet Corp.
 - 2) Gordon, Inc.; equivalent to above
 - 3) Pittcon Industries; equivalent to above
 - b. Specialty Joint:
 - 1) NOT USED
- B. Interior Trim: At all joint locations not defined in interior elevation drawings, joint system complying with ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
 - 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - e. Expansion (control) joint.
 - f. Curved-Edge Cornerbead: With notched or flexible flanges.
- C. Exterior Trim: ASTM C 1047.
 - 1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
 - 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Exterior Gypsum Soffit Board: Paper.
 - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
- D. Joint Compound for Exterior Applications:
 - 1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - 2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

- E. Joint Compound for Tile Backing Panels:
 - 1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - 2. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
 - 3. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound Attenuation Blankets: Reference and coordinate with Division 07 "Building Insulation". ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
 - 1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."
- G. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

2.8 TEXTURE FINISHES

- A. Reference and coordinate with Division 09 "Painting" for products and sequence of primer and gypsum board texture finishes.
- B. Primer: As recommended by textured finish manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.

- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Type X: As indicated on Drawings, typical product for use unless noted otherwise in specifications or drawings.
 - 2. Ceiling Type: As indicated on Drawings.
 - 3. Water-, Moisture- and Mold-Resistant Type: As indicated on Drawings, and use throughout rooms at all Restrooms, Kitchens, Janitor Closets, and within 6'-0" of the center line of any plumbing fixture in other locations. **Install 24 inches in height continuously at all ceramic wall tile base locations.**
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
 - 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 - 3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 - 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at showers, and where indicated and in locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Cementitious Backer Units: ANSI A108.11, at where indicated.
- C. Areas Not Subject to Direct Wetting: Install Water-, Moisture- and Mold-Resistant Type gypsum wallboard panels to produce a flat surface.
- D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
- E. **Fasten with corrosion-resistant screws.**

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. **Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.**
 - 1. Provide control joints in all gypsum board surfaces that extend for greater than 30' in a single plane (i.e. without offset of internal or external corners). Coordinate exact locations of joints with architect prior to framing.
 - 2. Provide control joints at all locations indicated in drawings, reference interior elevations and related drawings.
 - 3. Provide control joints at all locations where supporting substrate framing changes support condition (i.e. transitions from ground supported to suspended soffits and wall surfaces for example).
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners, unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated.
 - 4. U-Bead: Use at exposed panel edges.
 - 5. Curved-Edge Cornerbead: Use at curved openings.
- D. Aluminum Trim: Install in locations indicated on Drawings. Install in accordance with trim manufacturers recommendations and requirements.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: not used
 - 2. Level 2: At locations: ceiling plenum areas and all concealed areas.
 - 3. Level 3: not used.
 - 4. **Level 4: Smooth finish at all panel surfaces that will be exposed to view.**
 - 5. Level 5: not used.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: In accordance with 09 90 00, prepare and apply base coat primer to gypsum panels and other surfaces prior to applying texture finishes. Apply primer to surfaces that are clean, dry, and smooth per Painting Specification.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.
- D. Finish Primer: In accordance with 09 90 00, prepare and apply top coat primer to gypsum panels and other surfaces after applying texture finishes. Apply finish primer to surfaces that are clean, dry, and smooth per Painting specification.

3.8 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 00 – TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Porcelain floor and wall tile.
 - 2. Waterproof membrane for thin-set tile installations.
 - 3. Crack-suppression membrane for thin-set tile installations.
 - 4. Metal edge strips installed as part of tile installations.
 - 5. Accessories: Floor Sealers, as required to attain proper substrate condition, subfloor fillers, primers, and adhesives
 - 6. **Stainless Steel cover base extrusion.**
- B. Related Sections include the following:
 - 1. Division 02 Section "Selective Structure Demolition" for removing existing finishes.
 - 2. Division 03 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
 - 3. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 4. Division 09 Section "Gypsum Board" for installation of cementitious backer board.

1.2 DEFINITIONS

- A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.
- B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).
- C. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.3 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.6.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Assembled samples with grouted joints for each type and composition of tile and for each color and finish required, at least **12 inches** square and mounted on rigid panel. Use grout of type and in color or colors approved for completed work.
 - 3. Full-size units of each type of trim and accessory for each color and finish required.
 - 4. Metal edge strips in **6-inch** lengths.
- D. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- E. Maintenance Instructions: For each type of product installed.
- F. Product Certificates: For each type of product, signed by product manufacturer.
- G. Qualification Data: For Installer.
- H. Material Test Reports: For each tile-setting and -grouting product.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.

1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
 - B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
 - C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
 1. Waterproofing.
 2. Joint sealants.
 3. Metal edge strips.
 - D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 1. Build mockup of each type of floor tile installation.
 2. Build mockup of each type of wall tile installation.
 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.
 - B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
 - C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
 - D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.
 - E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.
- 1.7 PROJECT CONDITIONS
- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.
- 1.8 EXTRA MATERIALS
- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Tile and Trim Units: Furnish quantity of full-size units equal to 5 percent of amount installed, for each type, composition, color, pattern, and size indicated.
- 1.9 WARRANTY
- A. Provide two year defect-free specialty warranty. Warranty period commences on the date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 1. Basis-of-Design Product: The design for each tile type is based on the product named in the finish schedule. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
 - 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
 - 1. As indicated by manufacturer's designations in the Finish Schedule and Finish Material Designations.
- D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.
 - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.3 TILE PRODUCTS

- A. Available Manufacturers, Reference Finish Schedule and Finish Material Designations for specific product. Subject to substitution request, the following manufacturer's may be acceptable:
 - 1. American Marazzi Tile, Inc.
 - 2. American Olean; Div. of Dal-Tile International Corp.
 - 3. Buchtal Corporation USA.
 - 4. Cerim-Floor Gres Ceramiche.
 - 5. Crossville Ceramics Company, L.P.
 - 6. Daltile; Div. of Dal-Tile International Inc.
 - 7. Florida Tile Industries, Inc.
 - 8. GranitiFiandre.
 - 9. Interceramic.
 - 10. KPT, Inc.
 - 11. Laufen USA.
 - 12. Lone Star Ceramics Company.
 - 13. Metropolitan Ceramics.
 - 14. Monarch Tile, Inc.
 - 15. Porcelanite, Inc.
 - 16. Quarry Tile Company.
 - 17. Seneca Tiles, Inc.
 - 18. Summitville Tiles, Inc.
 - 19. United States Ceramic Tile Company.
 - 20. Winburn Tile Manufacturing Company.
- B. **Floor Tile:** Porcelain Floor Tile Units, conforming to ANSI A137.1. Cushioned edge. Provide shapes as follows, selected from manufacturer's standard shapes:
 - 1. Composition: Porcelain
 - 2. Module Size: 2" x 2" Mosaic (12"x24" sheet)
 - 3. Trim: all available trim, see section D below
 - 4. Thickness: 1/4 inch nominal

5. Floor Face: Unglazed, abrasive, slip resistant
 6. Base: Cove Base
 7. Basis-of-Design Product: Daltile, Mosaic Colorbody Porcelain
 - a. Reference drawings for required patterns.
 - b. Reference Finish Schedule for product color and texture.
 - c. Substitution requests for approved equal per Division 01.
- C. **Wall Tile:** Porcelain Floor Tile Units, conforming to ANSI A137.1. Cushioned edge. Provide shapes as follows, selected from manufacturer's standard shapes:
1. Composition: Porcelain
 2. Module Size: 2" x 4" Straight-joint Mosaic (12"x24" sheet)
 3. Trim: all available trim, see section D below
 4. Thickness: 1/4 inch nominal
 5. Basis-of-Design Product: Daltile, Mosaic Colorbody Porcelain
 - a. Reference drawings for required patterns.
 - b. Reference Finish Schedule for product color and texture.
 - c. Substitution requests for approved equal per Division 01.
- D. All Tile Types - Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:
1. Base for Thin-Set Mortar Installations: Straight with coved bottom, module size to coordinate with floor and wall tile.
 2. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size to coordinate with wall tile
 3. External Corners for Thin-Set Mortar Installations: Surface bullnose.
 4. Internal Corners: Field-buttet square corners except with coved base and cap angle pieces designed to fit with stretcher shapes.
 5. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide reduction in thickness from **1/2 to 1/4 inch** across nominal **4-inch** dimension.
- E. Quarry Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes to coordinate with installation condition for quarry tile tile types, selected from manufacturer's standard shapes:
1. Base: Coved with surface bullnose top edge, facial dimensions **6 by 3-7/8 inches**.
- 2.4 THRESHOLDS
- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to **1/2 inch (12.7 mm)** or less, and finish bevel to match face of threshold.
- B. Solid Polymer Thresholds: Made from homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without precoated finish.
1. Available Manufacturers:
 - a. Avonite, Inc.
 - b. DuPont Polymers.
 - c. Formica Corporation.
 - d. Nevamar; International Paper; Decorative Products Division.
 - e. Swan Corporation (The).
 - f. Wilsonart International; Div. of Premark International, Inc.
- 2.5 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANES FOR THIN-SET TILE INSTALLATIONS
- A. General: **At all floor tile locations, provide waterproofing and crack-suppression membrane complying with ANSI A118.10.**

1. Moisture content of concrete substrate must meet manufacturer's requirements prior to application.
 - a. Provide sheet membrane if moisture content level in concrete substrate does not meet manufacturer's requirements for liquid applied membrane products.

2.6 SETTING AND GROUTING MATERIALS

- A. Available Manufacturers:
 1. Atlas Minerals & Chemicals, Inc.
 2. Boiardi Products Corporation.
 3. Bonsal, W. R., Company.
 4. Bostik.
 5. C-Cure.
 6. Custom Building Products.
 7. DAP, Inc.
 8. Jamo Inc.
 9. LATICRETE International Inc.
 10. MAPEI Corporation.
 11. Southern Grouts & Mortars, Inc.
 12. Summitville Tiles, Inc.
 13. TEC Specialty Products Inc.
- B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:
 1. Prepackaged dry-mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
 2. Prepackaged dry-mortar mix combined with acrylic resin liquid-latex additive.
 - a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.
- C. Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. All Grout: Factory blend of epoxy base, Portland cement and additives. Dark in color. 1/16" maximum at small tile and 1/4" maximum at large tile.
 - a. Color to be selected from manufacturer full standard color range.

2.7 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 07 Section "Joint Sealants."
 1. Use sealants that have a VOC content of [250] <Insert limit> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
 1. Available Products:
 - a. Dow Corning Corporation; Dow Corning 786.
 - b. GE Silicones; Sanitary 1700.
 - c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
 - d. Tremco, Inc.; Tremsil 600 White.

2.8 CEMENTITIOUS BACKER UNITS

- A. Reference and Coordinate with 09 29 00 "Gypsum Board" for cementitious backer unit product and installation.

2.9 MISCELLANEOUS MATERIALS

- A. Provide any and all floor substrate sealers and preparations necessary to obtain a warranted installation based upon the carpet manufacturer's requirements. No additional time will be allowed to the contract performance period to complete substrate preparations.
- B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- C. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, stainless steel; ASTM A 666, 300 Series exposed-edge material.
 - 1. Brushed Stainless Steel Cove: Schluter – DIL-EHK/-HKS
 - a. Cover Base Transition with trapezoid-perforated anchoring legs, secured in mortar bed for visible cove transition.
 - b. Profile: 23/32"
 - c. Location: Continuous at Floor cove base
- D. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 - 1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
 - 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- E. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- F. Wet Areas: Provide abrasive slip resistant tile finish on all floor tile when specified for wet areas. This includes (but not limited to): kitchens, restrooms, showers, locker rooms, training rooms and lobbies/entries.
- G. Grout Sealer: Manufacturer's standard product for sealing grout joints that does not change color or appearance of grout.
 - 1. Available Products:
 - a. Bonsal, W. R., Company; Grout Sealer.
 - b. Bostik; CeramaSeal Grout Sealer.
 - c. C-Cure; Penetrating Sealer 978.
 - d. Custom Building Products; Surfaceguard Grout and Tile Sealer.
 - e. Jamo Inc.; Penetrating Sealer.
 - f. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.
 - g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
 - i. TEC Specialty Products Inc.; TA-256 Penetrating Silicone Grout Sealer.

2.10 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Provide concrete substrates for tile floors installed with adhesives or thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
 - 1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
 - 2. Remove protrusions, bumps, and ridges by sanding or grinding.
- C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.
- G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Locate joints in tile surfaces directly above joints in concrete substrates.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- H. Grout tile installation shall comply with ANSI A108.10 requirements.
- 3.4 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANE INSTALLATION
- A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.
 - B. Install crack-suppression membrane to comply with manufacturer's written instructions to produce membrane of uniform thickness bonded securely to substrate.
 - C. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
- 3.5 FLOOR TILE INSTALLATION
- A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.
 1. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.
 - a. Tile floors in wet areas.
 - b. Tile floors composed of tiles **8 by 8 inches** or larger.
 - B. Joint Widths: Install tile on floors with the following joint widths:
 1. Ceramic Tile: **1/8 inch.**
 2. Quarry Tile: **1/4 inch.**
 - C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
 - D. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.
- 3.6 WALL TILE INSTALLATION
- A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods.
 - B. Joint Widths: Install tile on walls with the following joint widths:
 1. Ceramic Tile: **1/8 inch.**
 2. Quarry Tile: **1/4 inch.**
- 3.7 CLEANING AND PROTECTING
- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 1. Remove grout residue from tile as soon as possible.
 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
 - B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
 - C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
 - D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.8 FLOOR TILE INSTALLATION SCHEDULE

- A. Reference and coordinate with Finish Schedule for manufacturer and products.

END OF SECTION 09 30 00

SECTION 09 51 23 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Related Sections include the following:
 - 1. Division 09 Section "Acoustical Tile Ceilings" for ceilings consisting of mineral-base acoustical tiles used with concealed suspension systems, stapling, or adhesive bonding.
 - 2. Division 09 Section "Acoustical Metal Panels."
- C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.2 DEFINITIONS

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Ceiling suspension system members.
 - 2. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 4. Minimum Drawing Scale: **1/4 inch = 1 foot.**
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of **6-inch-** square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension System Members, Moldings, and Trim: Set of **12-inch-** long Samples of each type, finish, and color.
- D. Qualification Data: For testing agency.
- E. Field quality-control test reports.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- G. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type.
- H. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- B. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from a single manufacturer.
- C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
 - a. Smoke-Developed Index: 450 or less.
 - E. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
 2. CISCAs Recommendations for Acoustical Ceilings: Comply with CISCAs "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
 3. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
 - F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
 - B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
 - C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.
- 1.6 PROJECT CONDITIONS
- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.
 2. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated and overhead mechanical work is completed, tested and approved
 3. Permit wet work to dry or cure prior to commencement of installation
 4. Maintain temperatures of 61 degrees F to 78 degrees F and humidity of 20% to 40% prior to, during and after installation
- 1.7 COORDINATION
- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
 - B. Coordinate and provide 30 days notice for Owner installed equipment above ceilings
 - C. Following installation of metal grid, allow up to 14 days for Owner installation of above ceiling items before tile installation
- 1.8 EXTRA MATERIALS
- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Acoustical Ceiling Panels: Provide six extra cartons (12 each) of tile of each size for each type of ceiling tile and store as directed.
 2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

3. Hold-Down Clips: Equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is **15-3/4 inches** away from test surface per ASTM E 795.
- B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.
- C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
- D. Antimicrobial Fungicide Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

- A. **SC-1** - Lay-in Acoustical Ceiling Tile Products: Subject to compliance with requirements, Provide panels complying with the following:
 1. Manufacturer and product:
 - a. Basis of Design: Armstrong, **Kitchen Zone 672**.
 - b. Celotex; equivalent to above
 - c. BPB USA; equivalent to above.
 - d. Chicago Metallic Corporation; equivalent to above.
 - e. Ecophon CertainTeed, Inc.; equivalent to above.
 - f. USG Interiors, Inc.; equivalent to above.
 2. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type and Form: Type IX, Form 2, Pattern G.
 - b. Color: White.
 - c. LR: Not less than 0.89.
 - d. NRC: N/A
 - e. Articulation Class: Not less than 190.
 - f. Edge/Joint Detail: 15/16" Square Lay-In.
 - g. Thickness: 5/8 inch.
 - h. Modular Size: 24 by 48 inches.
- B. **SC-2** - Lay-in Acoustical Ceiling Tile Products: Subject to compliance with requirements, Provide panels complying with the following:
 1. Manufacturer and product:
 - a. Basis of Design: Armstrong, Fine Fissured School Zone, Item No 1714
 - b. Celotex; equivalent to above
 - c. BPB USA; equivalent to above.
 - d. Chicago Metallic Corporation; equivalent to above.
 - e. Ecophon CertainTeed, Inc.; equivalent to above.

- f. USG Interiors, Inc.; equivalent to above.
- 2. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type and Form: Type III, Form 2, Pattern C E.
 - b. Color: White.
 - c. LR: Not less than 0.85.
 - d. NRC: Not less than 0.70.
 - e. CAC: Not less than 40.
 - f. Edge/Joint Detail: 15/16" Square Lay-In.
 - g. Thickness: 3/4 inch.
 - h. Modular Size: 24 by 48 inches.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
 - 1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 - c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
 - d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
 - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to [10] times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
 - 3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 - 4. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than **0.106-inch**-diameter wire.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than **7/8 inch** wide; formed with **0.04-inch**-thick, galvanized steel sheet complying with ASTM A 653/, **G90** coating designation; with bolted connections and **5/16-inch**-diameter bolts.
- G. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- H. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

- I. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.
- J. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced **24 inches** o.c. on all cross tees.

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Available Products: Subject to compliance with requirements, provide one of the following:
 - 1. Basis of Design: Armstrong World Industries, Inc.; Prelude Grid
 - 2. BPB USA; equivalent to above
 - 3. Chicago Metallic Corporation; equivalent to above
 - 4. Ecophon CertainTeed, Inc.; equivalent to above
 - 5. USG Interiors, Inc.; equivalent to above
- B. Wide-Face, Capped, Double-Web: Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than **G30** coating designation, with prefinished **15/16-inch** wide metal caps on flanges.
 - 1. Structural Classification: Intermediate-duty system.
 - 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Steel cold-rolled sheet.
 - 5. Cap Finish: Painted white.
- C. Provide hold-down clips at all panels.
- D. Provide identification rivets at panels for access to all maintenance items including but not limited to valves, dampers, disconnects, etc. as required by Owner. Reference Division 22 specification for Identification for Plumbing and Equipment for rivet colors corresponding with service equipment.

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Available Products: Subject to compliance with requirements, provide one of the following:
 - 1. Basis of Design: Armstrong World Industries, Inc.; Prelude Grid
 - 2. BPB USA; equivalent to above
 - 3. Chicago Metallic Corporation; equivalent to above
 - 4. Ecophon CertainTeed, Inc.; equivalent to above
 - 5. USG Interiors, Inc.; equivalent to above
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
 - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.6 ACOUSTICAL SEALANT

- A. Available Products: Subject to compliance with requirements, provide one of the following:
 - 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
 - 2. Acoustical Sealant for Concealed Joints:
 - a. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
 - b. Pecora Corporation; BA-98.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.
- B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 and effective in reducing

airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

- C. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - 7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 8. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 9. Do not attach hangers to steel deck tabs.
 - 10. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - 11. Space hangers not more than **48 inches** o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than **8 inches** from ends of each member.

12. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than **16 inches** o.c. and not more than **3 inches** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet**. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 3. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 4. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
 5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 6. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.
 7. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
 8. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 23

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.
 - 3. Aluminum molding accessories.
- B. Related Sections:
 - 1. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.
 - 2. Division 09 Section "Carpeting" for carpet floor coverings.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.
- C. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Mockups: Provide resilient products with mockups specified in other Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - c. Endura Rubber Flooring; Division of Burke Industries, Inc.
 - d. Flexco, Inc.
 - e. Johnsonite.
 - f. Mondo Rubber International, Inc.
 - g. Musson, R. C. Rubber Co.
 - h. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
 - i. Roppe Corporation, USA.
 - B. Resilient Base Standard: ASTM F 1861.
 1. Material Requirement: Type TS (rubber, vulcanized thermoset) or Type TP (rubber, thermoplastic).
 2. Manufacturing Method: Group I (solid, homogeneous) or Group II (layered).
 3. Style: Cove (base with toe), and Straight (base without toe).
 - C. Minimum Thickness: 0.125 inch.
 - D. Height: 4 inches or 6 inches - as indicated in Drawings and Finish Schedule.
 - E. Lengths: Coils in manufacturer's standard length.
 - F. Outside Corners: Job formed.
 - G. Inside Corners: Job formed.
 - H. Finish: Matte.
 - I. Colors and Patterns: As indicated by manufacturer's designations, reference Finish Schedule Material Finish Designations.
- 2.2 MOLDING ACCESSORY
- A. Molding Accessory:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Flexco, Inc.
 - c. Tarkett (Formerly Johnsonite).
 - d. R.C.A. Rubber Company (The).
 - e. Roppe Corporation, USA.
 - f. Schluter Systems
 - B. Description: Carpet edge for glue-down applications, Nosing for carpet, Nosing for resilient floor covering, Reducer strip for resilient floor covering, Joiner for tile and carpet and miscellaneous Transition strips.
 - C. Material: Rubber or Aluminum as noted on drawings
 - D. Flooring Transitions: As indicated or type and size to accommodate transition between flooring materials:
 1. Basis of Design for Vinyl Transition Strip: Tarkett CTA-XX-A
 2. Basis of Design for Aluminum Transition Strip: Schluter – RENO-RAMP/-K – 1/8" Tall
 3. Confirm other molding, trim, transition strips to suit individual applications and conditions
 - E. Colors and Patterns: As indicated by manufacturer's designations, reference Finish Schedule Material Finish Designations.
- 2.3 INSTALLATION MATERIALS
- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
 - B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Cove Base Adhesives: Not more than 50 g/L.

- b. Rubber Floor Adhesives: Not more than 60 g/L.
- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.
- D. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
 - 4. Moisture Testing: Perform tests recommended by manufacturer[and as follows]. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible. Miter cut to provide tight fitting joint with no gaps.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 2. Tightly adhere to substrates throughout length of each piece.
 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rubber tile floor covering, including pattern layout and designs as indicated in the drawings.
 - 2. Accessories: Floor Sealers, as required to attain proper substrate condition, subfloor fillers, primers, and adhesives
- B. Related Sections:
 - 1. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.2 REFERENCES

- A. American Society for Testing & Materials (ASTM):
 - 1. ASTM E 648: Standard Test Method for Critical Radial Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - 2. ASTM E 662 Test Method for Specific Density of Smoke Generated by Solid Materials.
 - 3. ASTM F 710 Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.
 - 4. ASTM F 970 Test Method for Static Load Limit.
- B. National Fire Protection Association
 - 1. NFPA 101: Code for Safety to Life from Fire in Buildings and Structures.
 - 2. NFPA 253 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
 - 3. NFPA 258 Test Method for Specific Density of Smoke Generated by Solid Materials

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- C. Samples for Verification: Full-size units of each color and pattern of floor tile required.
 - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- D. Seam Samples: For seamless-installation technique indicated and for each flooring product, color, and pattern required; with seam running lengthwise and in center of [6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.
- E. Product Schedule: For floor tile. Use same designations indicated on Drawings
- F. Qualification Data: For qualified Installer.
- G. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Installation of mock-up is required and must be deemed acceptable by Owner and Architect. Mock-up to be installed following the same procedure and material as per the actual floor.
 2. Build mockups for floor tile including resilient base and accessories.
 - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Materials must be delivered in manufacturer's original, unopened and undamaged containers with identification labels intact.
 - B. Store material protected from exposure to harmful weather conditions, on a clean, dry, flat surface protected from all possible damage.
 - C. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 55 deg F or more than 90 deg F. Store floor tiles on flat surfaces.
 - D. Material shall not suffer excessive damage during handling (i.e. edge chipping, excessive warping etc).
- 1.6 PROJECT CONDITIONS
- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 80 deg F, in spaces to receive floor tile during the following time periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
 - B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 90 deg F.
 - C. Close spaces to traffic during floor tile installation.
 - D. Close spaces to traffic for 48 hours after floor tile installation.
 - E. Installation to be carried-out no sooner than the specified curing time of concrete subfloor (normal density concrete curing time is approximately 28 days for development of design strength).
 - F. Moisture vapor emission content of the concrete slab must not exceed 3 lbs/1000 ft² per 24 hrs when using the Calcium Chloride test as per ASTM F 1869-98.
 - G. Install floor tile after other finishing operations, including painting, have been completed.
- 1.7 WARRANTY
- A. Provide manufacturer's standard five year warranty.
 - B. This rubber flooring is warranted to be free from manufacturing defects for a period of five years from the date of shipment from the manufacturer.
- 1.8 EXTRA MATERIALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Floor Tile: Furnish (2) boxes, of each type, color, and pattern of floor tile installed. Clearly identify on each box the color, type, and installed location of the tile.
 2. Repair material must be from the same dye lot as material supplied for initial installation. Maintain surface as per manufacturer's instructions (see Maintenance Instructions for Flooring)

PART 2 - PRODUCTS

2.1 RESILIENT TILE FLOORING – RT-1 Sports Flooring

- A. Products: Subject to compliance with requirements, Provide one of the following:
 1. Basis of Design: Johnsonite Inertia Square Edge
 2. Armstrong Inc.

3. Mohawk
 4. Mondo America
 5. Nora
 - B. Surface Texture: Hammered.
 - C. Thickness: 1/4" – homogeneous composition of 100% synthetic rubber.
 - D. Size: 24 by 24 inches.
 - E. Colors and Patterns:
 1. Color: Reference Finish Schedule, Finish Material Designations.
 2. Pattern: Reference Finish Schedule, Finish Material Designations
- 2.2 **RESILIENT TILE FLOORING – RT-2 Rubber Tile Flooring**
- A. Products: Subject to compliance with requirements, Provide one of the following:
 1. Basis of Design: Johnsonite – MicoTone – 3mm
 2. Armstrong Inc.
 3. Mohawk
 4. Mondo America
 5. Nora
 - B. Surface Texture: Hammered.
 - C. Thickness: 3.0 mm – homogeneous composition of 100% synthetic rubber.
 - D. Size: 24 by 24 inches.
 - E. Colors and Patterns:
 1. Color: Reference Finish Schedule, Finish Material Designations.
Pattern: Reference Finish Schedule, Finish Material Designations
- 2.3 **INSTALLATION MATERIALS**
- A. Provide any and all floor substrate sealers and preparations necessary to obtain a warranted installation based upon the carpet manufacturer's requirements. No additional time will be allowed to the contract performance period to complete substrate preparations.
 - B. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
 - C. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. VCT Adhesives: Not more than 50 g/L.
 - D. Floor Polish: Polish and seal flooring following substantial completion.
- 2.4 **SOURCE QUALITY**
- A. Source Quality: Obtain flooring product materials from a single manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
 - C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
 - D. Do not install floor tiles until they are same temperature as space where they are to be installed.
 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
 - E. Sweep & vacuum substrates to be covered by resilient products immediately before installation.
- 3.3 FLOOR TILE INSTALLATION
- A. Comply with manufacturer's written instructions for installing floor tile.
 - B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay tiles in pattern indicated. Reference Drawings.
 2. Alternate tile grain pattern direction in checker board pattern of single tiles.
 - C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles in pattern of colors and sizes indicated.
 - D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
 - E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
 - F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
 - G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
 - H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- 3.4 CLEANING AND PROTECTION
- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
 - B. Perform the following operations immediately after completing floor tile installation:
 1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
 - C. Protect floor tile products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
 - D. Floor Polish Preparation: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

- E. Joint Sealant: Apply sealant to resilient floor tile perimeter (where flooring base is omitted) and around columns, at door frames, and at other joints and penetrations.
- F. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19

SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Walk off mat
 - 2. Accessories: Floor Sealers, as required to attain proper substrate condition, subfloor fillers, primers, and adhesives
- B. Related Sections include the following:
 - 1. Division 09 Section "Resilient Tile Flooring and Resilient Base and Accessories" for resilient wall base and accessories installed with carpet.

1.2 SUBMITTALS

- A. Product Data: For the following, including installation recommendations for each type of substrate:
 - 1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Carpet Cushion: For each type indicated. Include manufacturer's written data on physical characteristics and durability.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - 2. Carpet type, color, and dye lot.
 - 3. Locations where dye lot changes occur.
 - 4. Seam locations, types, and methods.
 - 5. Type of subfloor.
 - 6. Type of installation.
 - 7. Pattern type, repeat size, location, direction, and starting point.
 - 8. Pile direction.
 - 9. Type, color, and location of insets and borders.
 - 10. Type, color, and location of edge, transition, and other accessory strips.
 - 11. Transition details to other flooring materials.
 - 12. Type of carpet cushion.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet: 12-inch- square Sample.
 - 2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch- long Samples.
 - 3. Carpet Cushion: 6-inch- square Sample.
 - 4. Carpet Seam: 6-inch Sample.
 - 5. Mitered Carpet Border Seam: 12-inch- square Sample. Show carpet pattern alignment.
- D. Product Schedule: For carpet. Use same designations indicated on Drawings.
- E. Qualification Data: For Installer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.
- G. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.
- H. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
 - 1. Carpet contractor shall be a firm established not less than five (5) years.
 - 2. Carpet contractor must be mill certified for installing products.
 - 3. Carpet contractor will be responsible for the proper product installation, including floor preparation, in those areas indicated in the Drawings.
- B. Single Source Responsibility: Provide products from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Mockups: Before installing carpet, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to carpet installation including, but not limited to, the following:
 - 1. Review delivery, storage, and handling procedures.
 - 2. Review ambient conditions and ventilation procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling."

1.5 PROJECT CONDITIONS

- A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
- B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.6 WARRANTY

- A. Special Warranty for Carpet: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, and runs, loss of tuft bind strength, excess static discharge and delamination.
 - 1. Warranty Period Lifetime from date of Substantial Completion.
 - a. Lifetime warranties must cover face components and backing components
 - b. Warranties must be non-prorated.
 - c. Carpet manufacturer must warrant both product and adhesive systems.
 - d. Fiber must have lifetime static warranty.
 - 2. Warranty to include coverage for:
 - a. Provide carpet installer's warranty against defects in installation
 - b. Provide full spectrum of Manufacturer's Lifetime warranties including, but not limited to, wear, tuft bind, static, edge ravel, zippering, delamination, impervious to liquids, and dimensional stability.
 - 3. Provide carpet installer's warranty against defects in installation.

4. Provide full spectrum of Manufacturer's Lifetime warranties including, but not limited to, wear, tuft bind, static, edge ravel, zippering, delamination, impervious to liquids, and dimensional stability.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet: Unopened boxes from same production run as installed material. Quantity equal to a minimum of 5 percent of amount installed for each type indicated, but not less than two (2) unopened boxes of 14 tiles each.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Products: Subject to compliance with requirements, provide one of the following:
- B. **Basis of Design: Mannington Commercial**
 1. **WALK: Mannington Commercial Carpet Tile, "Force – Infinity Modular" (walk-off mat)**
 - a. Color: Reference Finish Schedule, Finish Material Designations.
 - b. Pattern: Horizontal Brick Ashlar
 - c. Construction: Pattern Textured Loop
 - d. Face Weight: 36 oz/sq yd
 - e. Dye method: 100% Solution Dye
 - f. Gauge: 1/12
 - g. Stitches per inch: 10
 - h. Pile thickness: .185 inches
 - i. Wear warranty: Lifetime Limited Wear Warranty
 - j. Backing warranty: Lifetime Limited Backing Warranty
 - k. Standards:
 1. Methenamine pill test (astm-d-2859): passes
 2. Flooring radiant panel test (astm-e-648): class i (direct glue)
 3. N.B.S. smoke chamber test (astm-e-662): <450 (flamming mode)
 4. Dimensional stability aachen test: passes
 5. Electrostatic propensity test (aatcc 134): < 3.0 kv
 6. CRI indoor air quality control green label plus id: GLP7616
 7. Releaseable adhesive: Mnfr Standard
 8. CRI IAQ testing certification: PSA-970522
 9. Bond warranty: Lifetime Limited Warranty
 - l. Applied Soil-Resistance Treatment: Manufacturer's standard material
 - m. Substitution requests for approved equal per Division 01.

2.2 INSTALLATION ACCESSORIES

- A. Provide any and all floor substrate sealers and preparations necessary to obtain a warranted installation based upon the carpet manufacturer's requirements. No additional time will be allowed to the contract performance period to complete substrate preparations.
- B. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.
- C. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
 1. VOC Limits: Provide adhesives with VOC content not more than 50g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).
- D. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet[cushion] manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Do not commence with carpet installation until painting and finishing work is complete and ceilings and overhead work, tested, approved and completed
- D. Maintain room temperature at minimum 60 deg F for at least 24 hours prior to installation and relative humidity at approximately that at which the area is to be maintained
- E. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.
- F. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 INSTALLATION

- A. Comply with CRI 104 and carpet manufacturer's written installation instructions for the following:
 - 1. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions
- B. Provide sufficient lighting, 25 F.C. minimum
- C. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- D. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
 - 1. Install quarter turned
 - 2. Install pattern as shown on drawings and approved in submittals
- E. Extend carpet beneath door frame jambs and completely under island cabinets to allow relocation
- F. Do not bridge building expansion joints with carpet.
- G. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- H. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

- I. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- J. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.
- K. Prohibit traffic on floor finish for 48 hours after installation.

3.4 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI 104, Section 16, "Protection of Indoor Installations."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 09 68 13

SECTION 09 77 00 - PLASTIC WALL PANELING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Composite panel reinforced plastic wall paneling and trim accessories.
- B. Related Sections:
 - 1. Division 06 Section "Rough Carpentry" for wood furring for installing plastic paneling.
 - 2. Division 10 Section "Wall and Door Protection" for corner guards installed over plastic paneling.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Submit manufacturers installation instructions
- C. Samples for Initial Selection: For plastic paneling and trim accessories.
- D. Samples for Verification: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.
- B. Manufacturer: Company specializing in manufacturing FRP Panels with 3 years documented experience
- C. Installer: Company specializing in installing FRP Panels with 3 years documented experience
- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency. Materials shall comply with a Class "B" Flame Spread Rating.
 - 1. Flame-Spread Index: 26 to 75.
 - 2. Smoke-Developed Index: 450 or less.
- B. Performance Requirements:
 - 1. Resist lateral Impact force of 25 in. lbs. at any point without damage or permanent set. Test Method ASTM D5420.
 - 2. Barcol Hardness: 45 Test Method ASTM D2583.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Protect panel material, packaged adhesives, and sealants from temperature cycling and cold temperatures
- C. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperature above 60 degrees F, unless required otherwise by manufacturer's instructions
- D. Do not apply adhesive when substrate surface temperature or ambient temperature is below 60 degrees F or relative humidity is above 50 percent
- E. Maintain these conditions 24 hours before, during and after installation of FRP Panels
- F. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces, during installation

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING (**FRL-1**)

- 1. Basis-of-Design Product: as indicated in Finish Material Legend for manufacturer, product and color selections. Subject to compliance with those requirements, provide

- a. **FRL-1 - Nudo Allure Wall Panels**
 - b. By prior substitution request per Division 01 requirements identical product by one of the following may be acceptable:
 - 1. Marlite, Induro FRP
 - 2. Panolam Surface Systems
 - 3. Wilsonart Compact Laminate
 - 2. Composite core sandwiched between aluminum and a layer of high pressure laminate (HPL)
 - 3. Nominal Thickness: Not less than 0.15 inch
 - 4. Surface Finish: As indicated by manufacturer's designations in the Finish Schedule, Finish Materials Designations
 - 5. Color: As indicated by manufacturer's designations in the Finish Schedule, Finish Materials Designations
- 2.2 **PLASTIC SHEET PANELING (FRL-2)**
 - A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.
 - 1. Basis-of-Design Product: as indicated in Finish Material Legend for manufacturer, product and color selections. Subject to compliance with those requirements, provide
 - a. **FRL-2 – NUDO FiberLite FRP Wall Panels**
 - b. By prior substitution request per Division 01 requirements identical product by one of the following may be acceptable:
 - 1. Marlite, FRP
 - 2. Panolam Surface Systems
 - 2. Nominal Thickness: Not less than 0.09 inch
 - 3. Surface Finish: Embossed
 - 4. Fire Rating: Class C
 - 5. Color: As indicated by manufacturer's designations in the Finish Schedule, Finish Materials Designations
- 2.3 **ACCESSORIES**
 - A. Aluminum Trim Accessories at FRL-1: Manufacturer's aluminum extrusions designed to retain and cover edges of panels. Provide inside corners, outside corners, and caps as needed to conceal edges.
 - 1. Color: Clear Anodized Aluminum, Match Architect's sample.
 - 2. **Trim: AP-103 Slim-Reveal at all vertical and horizontal field joints.**
 - B. Vinyl Trim Accessories at FRL-2: Manufacturer's vinyl extrusions designed to retain and cover edges of panels. Provide inside corners, outside corners, and caps as needed to conceal edges.
 - C. Adhesive: As recommended by plastic paneling manufacturer.
 - 1. VOC Content: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - D. Sealant: Single-component, Latex sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint Sealants."
 - 1. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

- 3.1 **EXAMINATION**
 - A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - B. Verify that substrate surfaces are ready to receive work and conform to requirements of the FRP Panel manufacturer

- C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.
- B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation. Fill cracks and smooth irregularities with filler; sand smooth.
- C. Work of this section will include wall floating, filling, shimming and grinding necessary to provide a suitable substrate for the installation of the fiber reinforced panels. In no case will existing substrate joints be allowed to be visible after installation of the panels. Should installed panels telegraph underlying joints then the conditions will be corrected by contractor's expense.
- D. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
- E. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- F. Remove electrical, telephone, and wall plates and covers
- G. Lay out paneling before installing. Locate panel joints where indicated] and to provide equal panels at ends of walls not less than half the width of full panels.
 - 1. Mark plumb lines on substrate at [trim accessory] [panel joint] locations for accurate installation.
 - 2. Locate trim accessories and panel joints to allow clearance at panel edges according to manufacturer's written instructions.
 - 3. Reference drawings for panel joint locations.
- H. Vacuum clean surfaces free of loose particles

3.3 DELIVERY AND STORAGE

- A. All materials shall be inspected immediately upon delivery and effects reported. Remove panels from shipping skid and restack on a solid, flat, dry surface. Do not stack on fresh concrete floors or other surfaces that may emit moisture. Lay panels flat. Do not store on edge. Panels should be acclimated at least 24 hours in temperature and humidity conditions approximating the operating environment of the finished room. Damaged or deteriorated materials shall be removed from the premises.

3.4 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels horizontally in one piece from floor to height of wainscot, as indicated on Drawings. Horizontal joints not indicated in the drawings are not acceptable, Vertical joints only allowed at maximum panel lengths and corners.
- C. Razor trim edges on flat work table. Do not cut on gypsum board substrate surfaces
- D. Install panels in a full spread of adhesive to eliminate all bubbles or adhesive voids on back side of panels. Visible mechanical fasteners are not acceptable. Panels that bubble or pull out from wall substrate shall be re-installed with proper adhesive coverage.
- E. Install inside and outside corner and cap moldings at all applicable locations. Install trim accessories with adhesive and nails.
- F. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
- G. Install wall covering before installation of bases, hardware, or items attached to or spaced slightly from wall surface
- H. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- I. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant. Joint shall not exceed 3/32 inches wide.
- J. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

3.5 ADJUSTING AND CLEANING

- A. Repair damaged and defective work, where possible, to eliminate functional and visual defects; where not possible to repair, replace work. Adjust joinery for uniform appearance.
- B. Clean wall panels of excess adhesive, dust, dirt and other contaminants.
- C. Do not permit work at or near finished wall covered areas

END OF SECTION 09 77 00

SECTION 09 91 00 – PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. All surface preparation throughout the project
2. All site-applied painting and clear finish application on the project, including Site, Mechanical, and Electrical areas of work.
3. Surface finish schedule.

B. Related Sections

1. Mechanical items: Painting of anchors/hangers, piping, mechanical equipment, ductwork, insulation, etc. shall be performed by this section except where specifically stated otherwise in Division 22, or 23. All paint materials and methods, regardless of installer, shall meet the requirements set forth in Section 09 91 00 for Products and Execution. Upon completion of the project, all materials exposed to view shall be painted.
2. Electrical items: Painting of anchors/hangers, piping, mechanical equipment, ductwork, insulation, etc. shall be performed by this section except where specifically stated otherwise in Division 26, 27, or 28. All paint materials and methods, regardless of installer, shall meet the requirements set forth in Section 09 91 00 for Products and Execution. Upon completion of the project, all materials exposed to view shall be painted.

1.2 REFERENCES

- A. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D 2016 - Test Method for Moisture Content of Wood.
- C. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Provide product data on all finishing products.
- C. Submit three (3) 8"x 10" paint draw downs of each specified paint material in each specified color and sheen

1.4 QUALITY ASSURANCE

A. Qualifications

1. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with three years experience.
2. Applicator: Company specializing in commercial painting and finishing approved by product manufacturer.

B. Field Samples

1. Provide samples under provisions of Division 01.
2. Before proceeding with paint application, finish one complete typical wall with trim, door frames, doors, etc. of each paint type and color scheme required, clearly indicating selected colors, finish texture, materials and workmanship
2. Provide field sample panel, on at least 100-sq. ft. of surface until required sheen, color and texture are achieved.
3. Locate where directed.
4. Once each scheme has written approval of the Architect and the Owner, sample may remain as part of the Work.
5. If approved, sample area will serve as a minimum standard for workmanship throughout work

C. Regulatory Requirements

1. Conform to ASTM E 84 for flame/smoke rating requirements for finishes.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store and protect products under provisions of Division 01.
- C. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- D. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- E. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in well ventilated area, unless required otherwise by manufacturer's instructions.
- F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.6 PROJECT/SITE CONDITIONS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 85 percent unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperatures for Latex Paints: 50 degrees F; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish Finishes: 65 degrees F, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80-ft candles measured mid-height at substrate surface.

1.7 SPECIAL WARRANTY

- A. Under provisions of Division 01.
- B. Provide Manufacturer's Standard Material Warranty.

1.8 MAINTENANCE

- A. **Extra Stock: provide NEW (1) gallon of each type and color of paint or coating used—unopened and labeled buckets. Contractor shall remove and dispose of all opened containers, brushes and rollers used during construction. Only unopened new gallons of paint shall remain as extra stock transferred to owner.**

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **PAINT, STAIN, AND URETHANE**
 - 1. **Sherwin-Williams Company**
 - 2. **Standard Paint LLC**
 - 3. **Benjamin Moore Paints**
 - 4. **Rodda Paint**
- B. **HIGH PERFORMANCE COATING – EXPOSED EXTERIOR STEEL**
 - 1. **Basis of Design: Sherwin Williams**
 - a. **By substitution request: Carboline products equivalent to basis of design**
 - b. **By substitution request: Tnemec products equivalent to basis of design**
- C. **HIGH PERFORMANCE COATING – Elastomeric Paint**
 - 1. **Sherwin Williams**
- D. **ANTI-GRAFFITI COATING – Exterior Exposed Cast-in-Place Concrete Walls, Precast Concrete, and Concrete Masonry Unit Walls**
 - 1. **Sherwin Williams B97C00150**
 - a. **Single Component, non-sacrificial, siloxane coating**
- E. **PAINTED/SEALED CONCRETE FLOORS**
 - 1. **Sherwin Williams Armorseal seal finish system (Solid Color Coating)**
 - 2. **BASF MasterKure seal finish system (Transparent Sealer)**

- F. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
- B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- C. Provide a tint variation between all under coats and the final coat.
- D. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
- E. Refer to schedule at end of Section for surface finishes.
- F. VOC Content of Field-Applied Interior Primers, Paints, Coatings, Stains, and Transparent Finishes: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC content not more than 250 g/L.
 4. Floor Coatings: VOC content not more than 100 g/L.
 5. Shellacs, Clear: VOC content not more than 730 g/L.
 6. Shellacs, Pigmented: VOC content not more than 550 g/L.
 7. Clear Wood Finishes, Varnishes: VOC content not more than 350 g/L.
 8. Clear Wood Finishes, Lacquers: VOC content not more than 550 g/L.
 9. Stains: VOC content not more than 250 g/L.
- G. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop.
1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 2. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.

- u. Methylene chloride.
- v. Naphthalene.
- w. Toluene (methylbenzene).
- x. 1,1,1-trichloroethane.
- y. Vinyl chloride.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that substrate is ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - 3. Interior Located Wood: 15 percent, measured in accordance with ASTM D 2016.
 - 4. Concrete Floors: 12 percent.
 - 5. Beginning of installation indicates acceptance of substrate.
- D. Ensure surface temperatures or the surrounding air temperature is above 45 deg F before applying finishes. Minimum application temperatures for latex paints for interior work is 45 degrees F and 50 degrees F for exterior work. Minimum application temperature for varnish and stain finishes is 65 degrees F.
- E. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 45 degrees F for 24 hours before, during and 48 hours after application of finishes.
- F. Provide minimum 80 foot candles of lighting on surfaces to be finished. No exceptions

3.2 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing for finishing.
- B. Correct defects, patch and fill substrate cracks, dents, holes, and other surface inconsistencies to match adjacent surfaces. Clean surfaces which affect work of this Section.
- C. Shellac and seal marks which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Concrete Floors: Schedule to receive clear wear surface, remove contamination, shot blast and prepare according to wear surface manufacturer's instructions. Verify required acid-alkali balance is achieved. Allow to dry.
- F. Concrete floors scheduled to receive sealer: Prepare floor according to sealer manufacturer's instructions.
- G. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.
- H. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- I. Concrete Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose paint, mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry. Confirm all surfaces are smooth and structurally sound. All loosely adhering paint, coatings and concrete shall be completely removed by scraping, pressure washing, blasting or other mechanical means. Chalky, oxidized or contaminated surfaces must be washed with Marathon Cleaning Concentrate (MCC) or equal biodegradable cleaner.
 - 1. All cracks greater than hairline shall be routed to 1/16" and caulked with NP-1 urethane sealant.

- J. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.
- L. Steel Doors: Remove surface contamination and oils and wash with solvent. Seal top and bottom edges with primer.

3.3 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish, without streaking, telegraphing of drywall joints or brush marks.
- D. Apply finish coats of paint slightly darker than preceding prime coat unless otherwise approved.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.
- G. Back-roll all spray applied primer and finish coats on gypsum board or plaster finishes
- H. Prime back surfaces of interior and exterior woodwork with primer paint.
- I. Seal concrete floors with polyurethane sealer.
- J. Elastomeric Paint:
 - a. Application – Primer, apply per manufacturer's full recommendations.
 - b. Application – Topcoat, apply per manufacturer's full recommendations.
- K. Paint all roof top items, including but not limited to, ducts, pipe vents, roof hatches smoke vents, and ladders.
- L. Paint all Mechanical and Electrical Equipment exposed to public view, this shall include but not be limited to, ducts, conduits, fitting, suspension/anchors and boxes. Protect interior reflector surfaces of light fixtures from any paint application or overspray.
- M. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.
- N. Field finish surfaces not factory pre-finished. Extend finish all the way behind all casework, chalkboards, markerboards, and tackboards to allow relocation.
- O. Protection
 - 1. Adequately protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.
 - 2. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.
 - 3. Place cotton waste, cloths and materials which may constitute a fire hazard in closed metal containers and remove daily from site.
 - 4. Remove electrical plates, surface hardware, mechanical equipment, fittings and fastenings, prior to painting operations. These items are to be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvent to clean hardware that may remove permanent lacquer finish.
- P. Mechanical and Electrical Equipment
 - 1. Refer to mechanical and electrical sections with respect to painting and finishing requirements, color coding, identification banding of equipment, ducting, piping and conduit.
 - 2. Remove grilles, covers and access panels for mechanical and electrical systems from location, sand and paint separately.
 - 3. Finish paint primed and existing field painted equipment to color selected.
 - 4. Prime and paint insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports, except where items are plated or covered with a pre-finished coating.

3.4 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.5 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.9 SCHEDULES

- A. Shop-Primed Items for Site Finishing.
 - 1. Standard steel doors and frames (Division 08): All exposed surfaces, tops and bottoms of doors.
- B. Exterior Surfaces
 - 1. Pavement Markings: All striping and signage shall be in accordance with the City Standard Specifications and the latest Manual on Uniform Traffic Control Devices (MUTCD):
 - a. Two coat chlorinated rubber paint.
 - b. Standard color shall be white.
 - c. Handicapped symbols shall be painted standard blue.
 - d. No parking fire zone shall be painted yellow.
 - 2. Exposed Exterior Steel and field painted metals; including existing standing seam roofing, parapet cap flashing, exposed steel brackets, and other similar items (all exterior steel or metal on project unless noted otherwise):
 - a. Thoroughly remove all existing deteriorated finishes and clean surfaces completely. Reference Examination and Preparation sections above, and observe all of the paint manufacturer's recommendations.
 - b. Primer: Sherwin Williams Pro-Cryl Primer, applied at 3.0 mil dry film thickness
 - c. Intermediate Coat: Sherwin Williams Sher-Cryl HPA, applied at 3.0 -4.0 mil thickness
 - d. Finish Coat: Sherwin Williams Sher-Cryl HPA, applied at 3.0 -4.0 mil thickness
 - e. Approved substitution: Carboline or Tnemec system by approved substitution in accordance with Division 01 procedures.
 - 3. Steel Shop Primed (exterior hollow metal doors and frames only):
 - a. Touch up with zinc chromate primer per TTP-645A specifications.
 - b. Two Coats alkyd enamel, gloss, 3.0 mil gloss per TTP-37D specifications.
 - 4. Exposed Concrete and Concrete Masonry Units Surfaces to receive clear finish (Clear Masonry Sealer and Graffiti Protection). Integrally colored masonry units as indicated in the drawings and specifications.
 - a. One coat Masonry Sealer, clear finish, 2.0 dry thickness
 - b. One coat non-sacrificial barrier coating, SW B97C00150, clear finish, 9 mil min. dry thickness
 - 5. Pre-cast Concrete and Concrete Masonry Unit to receive opaque paint finish (Opaque Painted Finish) as indicated in the drawings.
 - a. Paint Finish – Loxon Exterior Acrylic Masonry Primer A24W300. Apply at 8 mils wet / 3.2 mils dry.
 - b. Paint Finish – ConFlex XL Smooth Elastomeric High Build Coating A5-400 Series – Two Coat System. 13.0 – 16.0 mils wet / 6.0 – 7.5 mils dry.
 - 6. Exterior exposed wood based or similar trim, composite trim, siding and panel products:

- a. Patch and fill all surface cracks, holes, and irregularities with paintable latex caulking and filling compound (caulking shall be guaranteed for 30 year working life).
 - b. One coat Primer: Exterior primer for acrylic enamels, manufacturer's standard for exterior siding application.
 - c. Two coats Exterior semigloss acrylic enamel. Equal to Columbia Chem-Clad #05059WB, 3.0 mils minimum, total of two coats.
- C. Interior Surfaces
 - 1. Steel - Primed:
 - a. Touch-up with original primer.
 - b. Paint Finish - One coat acrylic primer. 1.5 mil min.
 - c. Paint Finish - Two coats Alkyd (Pro Mar 200) semi-gloss finish. 3 mil min
 - 2. Steel - Galvanized:
 - a. One coat zinc chromate primer, 2.0 mil, per TTP-645A specifications.
 - b. Paint Finish - One coat acrylic primer. 1.5 mil min.
 - c. Paint Finish - Two coats Alkyd (Pro Mar 200) semi-gloss finish. 3 mil min
 - 3. Gypsum Board:
 - a. Sponge raw drywall tape joints and then apply one coat acrylic latex primer sealer with a vapor transmission rating less than one per TTP-1975 specifications, apply before final gypsum board texture coat.
 - b. One coat acrylic latex primer sealer with a vapor transmission rating less than one per TTP-1975 specifications, apply after final gypsum board texture coat.
 - c. Two coats acrylic latex enamel, semi-gloss sheen, 3.0 mil total of two coats per TTP-1511B specifications.
 - 4. Gypsum Board at toilet rooms and wet areas:
 - a. Sponge raw drywall tape joints and then apply one coat acrylic latex primer sealer with a vapor transmission rating less than one per TTP-1975 specifications, apply before final gypsum board texture coat.
 - b. One coat acrylic latex primer sealer with a vapor transmission rating less than one per TTP-1975 specifications, apply after final gypsum board texture coat.
 - c. Two coats epoxy enamel, semi-gloss sheen 3.0 mil.
 - 5. Concrete Block:
 - a. Paint Finish-one coat alkali resistant acrylic primer. 2.5 mil min
 - b. Paint Finish-one coat ("Polymide") acrylic-epoxy block filler. 1.5 mil min
 - c. Paint Finish- two coats semi-gloss (high solids) "Aquapon" Polymide-epoxy coating. 3 mil min
 - 6. Concrete:
 - a. Paint Finish-one coat alkali resistant acrylic primer. 2.5 mil min
 - b. Paint Finish-one coat ("Polymide") acrylic-epoxy block filler. 1.5 mil min
 - c. Paint Finish- two coats semi-gloss (high solids) "Aquapon" Polymide-epoxy coating. 3 mil min
 - 8. Concrete Floors (SC – Transparent Epoxy Floor Sealer):
 - a. Paint Finish-one coat Sherwin Williams ArmorSeal 33 Primer clear coat. 8 mil min.
 - b. Paint Finish-two coats Sherwin Williams ArmorSeal 1000 HS Epoxy clear coat: 3 mil min. each coat **with anti-slip aggregate.**
- D. Colors – Reference Finish Schedule and Finish Materials Designations.

END OF SECTION 09 91 00