

**STATE OF NEW HAMPSHIRE  
DEPARTMENT OF NATURAL AND CULTURAL RESOURCES  
DIVISION OF PARKS AND RECREATION  
PLANNING AND DEVELOPMENT**

172 Pembroke Road  
Concord, NH 03302-1856  
Tel. (603) 271-2606 Fax (603) 271-2629

PROJECT MANUAL

Project No.: CAP 2014

Pawtuckaway State Park

## Toilet Building #4 Renovations

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Nottingham, New Hampshire

6/14/2021

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**INVITATION TO BID**

TOILET BUILDING #4 RENOVATIONS  
CAP 2014  
NOTTINGHAM, NEW HAMPSHIRE

1. **Sealed Bids:** Proposals for a General Contract for the Construction of the above project will be received by the Owner until 2:00 P.M. prevailing time on Thursday, July 15, 2021, at which time they will be publicly opened and read aloud. All Bids shall be made out only on the form included in the specifications package and delivered in sealed, labeled envelope marked: Bid Proposal for Pawtuckaway Toilet Building #4 Renovations and deposited in the bid box located at the reception desk of the Department of Natural and Cultural Resources (DNCR) offices at 172 Pembroke Road in Concord, NH. Bidders are invited to attend the Bid opening. Bids received after the above stated time and date will not be accepted.
2. **Technical Questions:** Questions regarding the Bidding Documents shall be referred to: Department of Natural and Cultural Resources, 172 Pembroke Road, Concord New Hampshire, 03301, Telephone (603) 271-2606, attention Scott Coruth, Architect.
3. **Documents:** Bidding Documents may be examined at the Planning and Development Section of DNCR, 172 Pembroke Road, Concord NH and at the following locations:

**Construction Summary of New Hampshire Inc.:** 734 Chestnut Street, Manchester, New Hampshire 03104, (603) 627-8856, [www.constructionsummary.com](http://www.constructionsummary.com)

**Infinite Imaging:** 933 Islington Street, Portsmouth, NH 03801, (800) 581-2712 or (603) 436-3030, [www.planroom.infiniteimaging.com](http://www.planroom.infiniteimaging.com)

**McGraw-Hill Construction:** [www.construction.com](http://www.construction.com)

**Signature Digital Imaging:** 45 Londonderry Turnpike, Hooksett, NH 03106, (603) 624-4025, [www.signaturenh.com](http://www.signaturenh.com)

**Works in Progress:** 20 Farrell Street, Suite 103, South Burlington, VT 05403. (800) 286 3633 or (802) 658-3797

**New Hampshire Department of Administrative Services Bureau of Purchase and Property Website:** <http://admin.state.nh.us/purchasing/vendorresources.asp>

**New Hampshire State Parks Website:** [www.nhstateparks.org](http://www.nhstateparks.org) under the News & Events tab improvement projects sub tab

4. **Qualifications:** All companies, corporations, and trade names bidding must be registered and



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have a Certificate of Existence from the New Hampshire Secretary of State's Office, Corporate Division (telephone 603-271-3244) in order to do business with the State of New Hampshire

5. Bid Security: A Bid Bond in the amount of five (5%) percent of the total amount of the lump sum bid price shall accompany each Bid Proposal in accordance with the Instructions to Bidders.
6. Bonds: Bidders shall be required to provide the Owner with financial responsibility as security for the completion of the contract in accordance with the plans, specifications and contract documents, in the form of a Performance and Payment Bond in the amount of One Hundred (100%) Percent of the contract award, if the contract award is seventy-five thousand dollars (\$75,000) or more, the cost of which shall be a part of the Base Bid. The form of bond and the surety shall be acceptable to the Commissioner. No contract bond shall be required on contract awards of less than seventy-five thousand dollars (\$75,000).
7. Inspection of Site: A pre-bid tour of the existing building/site will be conducted by the Owner and Architect on July 1, 2021 at 10:00 a.m. Attendance by Bidders shall be considered mandatory.
8. Awards: In most cases the proposal submitted by the qualified bidder with the lowest base bid price shall be selected. However, the Department of Natural and Cultural Resources (DNCR) reserves the right to reject any or all proposals, or advertise for new proposals as it judges to be in the best interest of the state.

**END OF INVITATION TO BID**

**SECTION 00 21 13**

**INSTRUCTIONS TO BIDDERS**

**DEFINITIONS**

1. Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.
2. Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements include the Invitation to Bid, Instructions to Bidders, the Proposal Form and other sample Bidding and Contract forms.
3. Addenda are written or graphic instruments issued prior to the execution of the Contract. They modify or interpret the Bidding Documents by additions, deletions, clarifications, or corrections. Addenda will become part of the Contract Documents when the Construction Contract is executed.
4. A Bid is a complete and properly signed Proposal to do the Work or designated portion thereof for the sums stipulated therein, submitted in accordance with the Bidding Documents.
5. The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or deducted for sums stated in Alternate Bids.
6. An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in Work, as described in the Bidding Documents, is accepted.
7. A Unit Price is an amount stated in the Bid as a possible price per unit of measurement for materials, equipment, services or a portion of the Work as described in Bidding Documents. The choice of using Unit Prices, or an alternative method of payment, for additional Work shall be left solely to the Owner's discretion.
8. A Bidder is a person or entity who submits a Bid.
9. A Sub-Bidder is a person or entity who submits a bid to a Bidder for materials, equipment or labor for a portion of the Work.

**BIDDER'S REPRESENTATION**

1. Each Bidder by making his Bid represents that he has examined and understands the Bidding Documents, that the Bidding Documents are adequate to produce the required results, and that his Bid is in accordance therewith.

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2. Each Bidder by making his Bid represents that he has visited and thoroughly inspected the existing building and site and familiarized himself with the local conditions under which the Work will be performed. Bidders are encouraged to make any and all inspections and tests as they feel necessary to achieve such familiarization prior to submitting Bids. Such inspections and tests shall be conducted at times mutually acceptable to the Owner and Bidder. Unless waived by the Owner, Bidders shall make repairs following their testing, as necessary to restore tested areas to pre-testing condition. Should a Bidder conclude that time or other factor(s) prohibits him from performing sufficient tests, he shall so notify the Owner, in writing, prior to the receipt of Bids.
3. The submission of a Bid will be construed as conclusive evidence that the Bidder has made all such examinations and inspections necessary for a complete and proper assessment of the Work required, and that the Bidder has included in his Bid a sum sufficient to cover the cost of all items necessary to perform the Work as set forth in the proposed Contract Documents. No allowance will be made to a Bidder because of lack of such examination, inspection or knowledge.
4. Each Bidder by making his Bid represents that he has assessed the conditions of the current construction marketplace, and verified that an adequate, experienced workforce is available to suitably man the Work of this Project, and complete it in a timely fashion.
5. Each Bidder is assumed to have made himself familiar with all Federal, State and Local laws, ordinances and regulations which in any manner affect those engaged in or upon the Work, or in any way affect those engaged or employed in the Work, and no plea of misunderstanding will be considered on account of ignorance thereof. The Contractor shall comply with all taxes, fees and assessments as levied by Federal, State and Local authorities.

**BIDDING PROCEDURES**

1. All Bids must be prepared on the Proposal forms provided in the Specification and submitted in duplicate copies in accordance with the Notice to Bidders and Instructions to Bidders.
2. A Bid shall be invalid if it has not been deposited at the designated location prior to the time and date in the Invitation to Bid, or prior to any extension thereof issued to the Bidders.
3. Each copy of a Bid shall be signed by the person or persons legally authorized to bind the Bidder to a Contract.
4. Unless otherwise provided in any supplement to these Instructions to Bidders, no Bidder shall modify, withdraw or cancel his Bid or any part thereof for Ninety (90) days after the time designated for the receipt of Bids in the Notice to Bidders.
5. Prior to the receipt of Bids, Addenda will be e-mailed, mailed or delivered to each person or firm recorded by the Owner as having attended pre-bid conferences and will be available for inspection wherever the Bidding Documents are kept available for that purpose.

**BID SECURITY**

**Toilet Building #4 Renovations**

1. Bid Security shall be made payable to the Owner, in the amount of not less than five percent (5%) of the Bid Sum and shall be attached to the Bid. Security shall be either a certified check or Bid Bond issued by surety licensed to conduct business in the State of New Hampshire. The successful Bidder's security will be retained until he has signed the Agreement or Contract and furnished the required Performance and Payment Bonds and Certificates of Insurance. The Owner reserves the right to retain the Security of the next two lowest Bidders until the low Bidder enters into a Contract, or until Ninety (90) days after Bid opening, whichever occurs first. Bid Security of all other Bidders will be returned as soon as practicable. If any Bidder refuses to enter into an Agreement or Contract, the Owner will retain his Bid Security as liquidated damages, but not as a penalty.

**EXAMINATION OF BIDDING DOCUMENTS**

1. Each Bidder shall examine the Bidding Documents carefully and, not later than seven (7) days prior to the date of receipt of Bids, shall make written request to the Owner for interpretation or correction of any ambiguity, inconsistency or error therein, which he may discover. Any interpretation or correction will be issued as an Addendum by the Owner. Only a written interpretation or correction by Addendum will be binding. No Bidder shall rely upon any interpretation or correction given by any other method. Bidders are encouraged to direct any questions which may arise to the Owner, in order to provide necessary clarifications prior to the receipt of Bids. Bidders shall promptly notify the Owner of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents, or the existing building, site or local conditions. Should a Bidder fail to notify the Owner of errors, discrepancies or contradictions, he shall be assumed to have bid the more expensive alternative.

**SUBSTITUTIONS**

1. Each Bidder represents that his Bid is based upon the materials and equipment described in the Bidding Documents. Where the language "or approved equal" is used in the Bidding Documents, it is intended to require that all such materials and equipment shall be submitted as required by these Instructions to Bidders, and approved by the Owner prior to the receipt of Bids.
2. No substitution will be considered unless written request has been submitted to the Owner for approval at least seven (7) days prior to the date for receipt of Bids. Each such request shall include a complete description of the proposed substitute, the name of the material or equipment for which it is to be substituted, drawings, cuts, performance and test data and any other data or information necessary for a complete evaluation. A statement identifying changes in other materials, equipment or other portions of the Work that incorporation of the proposed substitution would require shall also be included.
3. If a Bidder proposes to use a material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, he shall inform the Owner in writing of the nature of such deviations at the time the material is submitted for approval. It shall be the responsibility of the Bidder to notify the Owner, in writing, of the presence of Asbestos or any other hazardous materials in any proposed substitution. Such written notice shall be in the form of a cover letter attached to the related documents.

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4. In requesting approval of deviations or substitutions, a Bidder shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that otherwise attainable. If, in the opinion of the Owner, the evidence presented by the Bidder does not provide a sufficient basis for such reasonable certainty, the Owner may reject such substitution or deviation without further investigation.
5. In requesting approval of substitutions, a Bidder represents that he will provide the same warranty and/or guarantee for the substitution that he would for that specified.
6. The Contract Documents are intended to produce a building and site improvements of consistent character and quality of design. The Owner shall judge the design and appearance of proposed substitutes on the basis of their suitability in relationship to the overall design of the project, as well as for their intrinsic merits. The Owner will not approve as equal to materials specified proposed substitutions which, in his opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the project.
7. The Contractor shall be solely responsible for coordinating the installation of accepted substitutions, making such changes as may be required for the Work to be complete in all respects. Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Owner, unless such substitution was made at the written request or direction of the Owner.
8. The burden of proof of the merit of a proposed substitution is upon the proposer. Approval of a proposed substitution is valid only upon issuance by the Owner in written form, and the Owner's decision of approval or disapproval of a proposed substitution shall be considered final.

**END OF INSTRUCTIONS TO BIDDERS**

New Hampshire Department of Natural and Cultural Resources  
**Toilet Building #4 Renovations**

**SECTION 00 41 13**

**BID PROPOSAL FORM**

**Project No.**                    **CAP #2014**

**PROJECT:**                    **Toilet Building #4 Renovations**  
Nottingham, New Hampshire

**DATE BID OPENING:**   **July 15, 2021** at 2:00 pm at DNCR's office at 172 Pembroke Road, Concord, NH

**START DATE:**            **October 18, 2021**

**COMPLETION DATE:**   **May 20, 2022**

Sealed bid proposals for the above project will be accepted until **2:00 p.m., July 15, 2021**. Bids may be deposited in the bid box at DNCR's offices in Concord or mailed to the attention of Scott Coruth, Architect, Department of Natural and Cultural Resources (DNCR), 172 Pembroke Road, Concord NH 03301. Please note on the outside of the sealed envelope: Bid Proposal for Pawtuckaway Toilet Building #4 Renovations.

**DATE:** \_\_\_\_\_

**PROPOSAL OF:** \_\_\_\_\_

**GRAND TOTAL / LUMP SUM BASE BID (A+B):** \_\_\_\_\_

**Toilet Building #4 Renovations**

**PROPOSAL**

Proposal of...

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(name)

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(address)

To furnish and deliver all materials except as noted and to perform all work in accordance with the Contract of the State of New Hampshire, Department of Natural and Cultural Resources for the construction of...

Project: **CAP # 2014 Toilet Building #4 Renovations**  
Nottingham, New Hampshire

Commissioner  
Department of Natural and Cultural Resources  
172 Pembroke Road  
Concord, N.H. 03302-1856

Commissioner:

In accordance with the advertisement of the Department of Natural and Cultural Resources inviting proposals for the project herein before named and in conformity with the Plans and Specifications on file in the office of the Department of Natural and Cultural Resources, \_\_\_\_\_

(firm name) hereby certifies that \_\_\_\_\_ is/are the only person, or persons, interested in this proposal as principals; that this proposal is made without collusion with any person, firm, or corporation; that an examination has been made of the Plans, of the Standard Specifications, and Special Attentions, Supplemental Specifications, and Special Provisions, all of which are attached hereto, and also of the site of the work; and I, or we, propose to furnish all necessary machinery, equipment, tools, labor, and other means of construction, and to furnish all materials specified in the manner and at the time prescribed; and understand that the quantities of work as shown herein are approximate only and are subject to increase or decrease, and further understand that all quantities of work are to be performed at the quoted prices.

To execute the form of contract and begin work within 15 (fifteen) days after the notice to proceed has been received or otherwise delivered to the contractor and to prosecute said work until its completion.

**It is further proposed:**

**Toilet Building #4 Renovations**

To furnish a contract bond in the amount of one hundred percent (100%) of the contract award, if the contract award is seventy-five thousand dollars (\$75,000) or more, as security for the completion of the contract in accordance with the plans and specifications and contract documents. The form of bond shall be that provided for by the Department, and the surety shall be acceptable to the Commissioner. No contract bond shall be required on contract awards of less than seventy-five thousand dollars (\$75,000).

To guarantee all of the work performed under this contract to be done in accordance with the plans and specifications and contract documents.

Enclosed, herewith, find certified check or bid bond in the amount of 5% of the total amount of the Lump Sum Price made payable to the "Treasurer, State of New Hampshire" as a proposal guarantee which is understood, will be forfeited in the event the form of contract is not executed, if awarded to the undersigned. Note: Personal checks will not be accepted as a proposal guarantee.

The undersigned acknowledges receipt of the following addenda, issued during the bidding time, and states that these have been incorporated in the proposal:

Addendum #1 dated \_\_\_\_\_

Addendum #2 dated \_\_\_\_\_

Addendum #3 dated \_\_\_\_\_

Dated \_\_\_\_\_

**ALLOWANCE #1: Unanticipated Modification and/or Additions to Contract Items:**

Include in the Contract, a stipulated sum/price of \$50,000 for use upon the Project Managers instruction. This Allowance will make money available for modifications and/or additions to contract items due to owner-initiated changes, or for unknown, latent or differing existing conditions, or for the removal of hazardous materials that are encountered by construction.

- a. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Allowance. The cost of the bond for the amount of Allowance shall be included as part of the lump sum base bid.
- b. Funds will be drawn from an Allowance only by Change Order. Contractor can proceed with Change Order Work against Allowance with direction from the Project Manager. The Contractor shall not proceed with any work that will exceed the amount of Allowance remaining.
- c. Credits can only be added to an Allowance by Alteration Order. The Contractor may not use a credit until an Alteration Order is fully executed.
- d. Notwithstanding the Contractors objection, the Project Manager may at any time reduce



**Toilet Building #4 Renovations**

the funds remaining in the Allowance by Alteration Order.

- e. At Final Payment of the Contract, funds remaining in the Allowance will be credited to the State.

**Toilet Building #4 Renovations****SCHEDULE OF VALUES: Pawtuckaway Toilet Building #4 Renovations**

INDICATE DOLLAR AMOUNT OF CONTRACT SUM ALLOCATED TO EACH CATEGORY OF WORK AS DESIGNATED BELOW:

<b>Specification Sections</b>	<b>Description</b>	<b>Amount</b>
	<b>General Conditions</b>	
	<b>Bond Costs</b>	
	<b>Insurance</b>	
<b>02 41 19</b>	<b>Demolition</b>	
<b>03 30 00</b>	<b>Cast-In-Place Concrete</b>	
<b>05 52 13</b>	<b>Pipe and Tube Railings</b>	
<b>06 10 00</b>	<b>Rough Carpentry</b>	
<b>06 20 00</b>	<b>Finish Carpentry</b>	
<b>06 61 16</b>	<b>Solid Surfacing Fabrications</b>	
<b>06 64 00</b>	<b>Plastic Paneling</b>	
<b>07 25 00</b>	<b>Weather Barriers</b>	
<b>07 31 13</b>	<b>Asphalt Shingles</b>	
<b>07 46 23</b>	<b>Wood Siding</b>	
<b>07 92 00</b>	<b>Joint Sealants</b>	
<b>08 16 00</b>	<b>Composite Doors</b>	
<b>08 62 00</b>	<b>Unit Skylights</b>	
<b>08 71 00</b>	<b>Door Hardware</b>	
<b>09 29 00</b>	<b>Gypsum Board</b>	
<b>09 67 23</b>	<b>Resinous Flooring</b>	
<b>09 91 00</b>	<b>Painting, Staining and Transparent Finishing</b>	
<b>09 93 00</b>		
<b>10 14 00</b>	<b>Signage</b>	
<b>10 21 00</b>	<b>Compartments and Cubicles</b>	
<b>10 28 00</b>	<b>Toilet, Bath and Laundry Accessories</b>	
<b>22 00 00</b>	<b>Plumbing</b>	
<b>23 00 00</b>	<b>Heating, Ventilating and Air Conditioning</b>	
<b>26 00 00</b>	<b>Electrical</b>	
<b>31 10 00</b>	<b>Site Clearing</b>	
<b>31 20 00</b>	<b>Earth Moving</b>	

**Sub Total (A):**

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New Hampshire Department of Natural and Cultural Resources  
**Toilet Building #4 Renovations**

**Allowance #1 (B):**

\$50,000

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**Grand Total: lump sum base bid (A + B)**

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**NOTE:** The Schedule of Values must be completely filled out in order for bid proposal to be considered responsive.

**SIGNATURE PAGE**

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

E-mail Address: \_\_\_\_\_

Signature of Authorized Bidder:

\_\_\_\_\_

Print: \_\_\_\_\_

Title: \_\_\_\_\_

Address of Bidder: \_\_\_\_\_

(If different than company)

Names and Addresses of Members of the Firm/Corporation

Name \_\_\_\_\_ address \_\_\_\_\_

Name \_\_\_\_\_ address \_\_\_\_\_

Name \_\_\_\_\_ address \_\_\_\_\_

**SECTION 00 73 00**

**SUPPLEMENTARY CONDITIONS**

The General Conditions of this Contract are the American Institute of Architect's Document A201, "General Conditions of the Contract for Construction," Fourteenth Edition, 1987, 14 Articles, 24 pages, herein referred to as "AIA General Conditions."

**THE SUPPLEMENTARY CONDITIONS**

The Supplementary Conditions contain modifications, deletions, and/or additions to the AIA General Conditions. Where any part of the AIA General Conditions is modified, deleted or superseded by the Supplementary Conditions, the unaltered provisions shall remain in full effect.

**BIDDING REQUIREMENTS**

Bids shall only be accepted on the official Bid Proposal Forms, attached to these specifications. **Any bids submitted that are not on the official bid proposal forms will not be accepted.**

**CONDITIONS AT SITE OR BUILDING**

Bidders shall visit the site and be responsible for having ascertained pertinent local conditions such as: location, accessibility, general character of the site and the character and extent of existing work to remain, and any other work being performed thereon at the time of the submission of this bid.

**PERFORMANCE AND PAYMENT BOND**

In the event the bid is \$75,000 or more, the contractor shall furnish security by bond or otherwise in an amount equal to 100% of the contract guaranteeing performance and payment. The payment security shall meet the requirements of New Hampshire RSA 447:16.

The performance and payment bond must be returned with the signed contract within 15 days after the contract has been mailed or otherwise delivered to the bidder.

**PROPOSAL GUARANTEE**

The Contractor shall furnish a certified check or bid bond in the amount of 5% of the total amount of the Lump Sum Price made payable to the "Treasurer, State of New Hampshire" as a proposal guarantee. This proposal guarantee will be forfeited in the event that the contract is not executed. Personal checks will not be accepted.

**DETERMINATION OF RIGHT TO DO BUSINESS WITH STATE OF N.H.**

If selected as the low bidder, the bidder must be registered and have a certificate of existence from the

**Toilet Building #4 Renovations**

Secretary of State, Corporate Division (telephone 603-271-3244) in order to do business with the State of New Hampshire.

**PROPOSAL SELECTION**

In most cases the proposal submitted by the qualified bidder with the lowest base bid price shall be selected. However, the Department of Natural and Cultural Resources (DNCR) reserves the right to reject any or all proposals, or advertise for new proposals as it judges to be in the best interest of the state.

**CONTRACTORS QUALIFICATIONS**

The successful bidder shall provide evidence upon request that they have been successfully performing this type, scale, and quality of work for a minimum of five years. Upon request, a comprehensive list of all similar projects worked on in the past two years by the general contractor shall be submitted along with contact information for 3 references of owner's representatives involved with three different projects completed by the contractor.

**EXECUTION OF CONTRACT**

The Contractor's attention is called to the following:

EXECUTION AND APPROVAL OF CONTRACT. The contract shall be signed by the successful Bidder and returned, together with the contract bond, if applicable, within 15 days after the contract has been mailed or otherwise delivered to the Bidder. No contract shall be considered as in effect until it has been fully executed by all the parties thereto and, when the contract amount is more than \$10,000, the award has been concurred in by the Governor and Council.

FAILURE TO EXECUTE CONTRACT. Failure to execute the contract within 15 days after the contract has been mailed or otherwise delivered to the successful Bidder shall be just cause for the cancellation of the award and the forfeiture of the proposal guaranty which shall become the property of the Department, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest Bidder, or the work may be re-advertised as the Commissioner of DNCR may decide.

**STARTING DATE**

The Contractor shall start work after the Notice to Proceed is received. The Notice to Proceed shall be issued immediately upon contract approval by the Governor and Council, and shall establish the actual construction start date. Failure to start work within 15 calendar days after the start date shall be considered a default of the contract. If the actual start date is later than the advertised start date, the completion date shall be extended by an equivalent number of working days.

**WORKERS COMPENSATION INSURANCE**

Workers compensation insurance is required for all workers on the job site of this project. Per RSA 21-1:81-b At the onset of work on any NH state construction project, the general contractor or designated

**Toilet Building #4 Renovations**

project construction manager, if any, shall provide to the Department Project Manager a current list of all subcontractors and independent contractors that the general contractor has agreed to use on the job site, with a record of the entity to whom that subcontractor is insured for workers compensation purposes. This list shall be posted on the jobsite and updated as needed to reflect any new subcontractors or independent contractors.

If it is determined that a subcontractor or independent contractor is present on a state construction site without the contractor's name and direct contracting relationship being posted in a visible location at the worksite, the general contractor or designated project manager shall require the subcontractor or independent contractor to provide the information within 36 hours and to post the information in a visible location at the worksite. If the information is not provided within 36 hours of its request, the general contractor shall suspend the contractor until the information is provided and posted.

**PROTECTION OF EXISTING PROPERTY**

It shall be the responsibility of the contractor to protect existing property from damage. Any damage caused by the contractor in the performance of the work shall be repaired or replaced at his expense to the satisfaction of the designated DNCR Project Manager.

**CODES**

All work performed shall meet the provisions, if applicable, of the current New Hampshire State Building Code.

**WORKMANSHIP**

All work shall be performed in a neat workmanlike manner by skilled workmen who have been actively engaged in performing the type of work specified under this contract for the last two years.

**CLEAN-UP**

The site for this project is in a NH State Park and will be open to the public throughout the construction period. It is important to the Department of Natural and Cultural Resources that the site be maintained in a clean and presentable condition for the public. Therefore, all debris from the project shall be cleaned up daily and removed from the site at least on a weekly basis.

**DEFAULT AND TERMINATION OF CONTRACT**

If the Contractor...

- a) Fails to begin the work under the contract within the time specified in the contract, or
- b) Fails to perform the work with sufficient workmen and equipment or with sufficient materials to assure the prompt completion of said work, or
- c) Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such

work as may be rejected as unacceptable and unsuitable, or

- d) Discontinues the prosecution of work, or
- e) Fails to resume work which has been discontinued, within reasonable time after notice to do so, or
- f) Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or
- g) Makes an assignment for the benefit of creditors, or
- h) For any other cause whatsoever, fails to carry on the work in an acceptable manner...

The Commissioner of DNCR will give notice in writing to the Contractor of such delay, neglect, or default.

If the Contractor or Surety does not proceed in accordance with the Notice, then the Commissioner will, upon written notification from the Project Manager of the fact of such delay, neglect or default, and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the prosecution of the work out of the hands of the Contractor. The Commissioner may enter into an agreement for the completion of said contract according to the terms and conditions thereof, or use such other methods as in his opinion will be required for the completion of said contract in an acceptable manner.

All extra costs and charges incurred by the Department as a result of such delay, neglect or default, together with the cost of completion of the work under the contract will be deducted from any monies due or which may become due said Contractor. If such expenses exceed the sum which would have been payable under the contract, then the Contractor and the Surety shall be liable and shall pay to the Department, the amount of such excess.

#### **FAILURE TO COMPLETE THE WORK ON TIME**

If the Contractor fails to complete all of the work or sections of the Project, within the time specified in the Contract, the sum given in the schedule that follows will be deducted from any money due the Contractor. This deduction will be made, not as a penalty, but as fixed, agreed liquidation damages for inconvenience to the State and for reimbursing the Department the cost of the Administration of the Contract, including engineering and inspection. Should the amount of money otherwise due the Contractor be less than the amount of such liquidated damages, the Contractor and his Surety shall be liable to the State for such deficiency.

Permitting the Contractor to continue and finish the work after the time fixed for its completion, shall in no way obligate the State to waive any of its rights under the Contract.

When the final acceptance has been duly made by the Project Manager, any liquidated damage charges shall end.

The fixed, agreed, liquidated damages shall be assessed in accordance with the following schedule.



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**ORIGINAL CONTRACT AMOUNT**

**AMOUNT OF LIQUIDATED DAMAGES  
PER WORKING DAY**

From more than:	to and including:	
\$0.00	\$25,000.00	\$ 300.00
\$25,000.00	\$50,000.00	\$ 400.00
\$50,000.00	\$100,000.00	\$ 500.00
\$100,000.00	\$500,000.00	\$ 600.00
\$500,000.00	-	\$ 800.00

**SUBSTANTIAL COMPLETION & FINAL INSPECTION**

When the work is substantially complete, the Contractor shall submit to the Project Manager, a list of items of work to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents. On the basis of an inspection by the Project Manager which determines that the work is substantially complete, a Certificate of Substantial Completion shall establish the date of substantial completion and state the responsibilities for any damage to the work and insurance, and fix the time limit within which the Contractor shall complete the items listed herein. Warranties required by the Contract documents shall commence on the date of Substantial Completion unless otherwise provided in the Certificate of Substantial Completion.

If the Contractor fails to proceed to complete the items on the "punch list", then in addition to the corrective measures listed in the Certificate of Substantial Completion, the Commissioner may use the monies still due the Contractor to have such items completed and the Contractor shall lose any claim to the monies used.

Upon written notice that the Work is ready for final inspection and acceptance, the Project manager shall promptly make such inspection, and when he finds the Work acceptable under the Contract documents and the Contract fully performed, a Certificate of Final Payment will be issued.

Final inspection will be made by the Project Manager. Incomplete items necessary to complete the project shall be done prior to final payment.

**GUARANTEE OF WORK**

1. Except as otherwise specified, all work shall be guaranteed by the Contractor against defects resulting from the use of inferior materials, equipment or workmanship for **one year** from the date of substantial completion of the work.
2. If, within any guarantee period, repairs or changes are required in connection with guaranteed work, which in the opinion of the Project Manager, is rendered necessary as a result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the Contract, the Contractor shall, promptly upon receipt of notice from the Commissioner, and at his own expense:

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- a. Place in satisfactory condition in every particular, all of such guaranteed work; correct all defects therein, and...
  - b. Make good all damage to the building or site, or equipment or contents thereof, which in the opinion of the Project Manager, is the result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the Contract, and...
  - c. Make good any work or material, or the equipment and contents of said building or site disturbed in fulfilling any such guarantee.
3. In any case, wherein fulfilling the requirements of the Contract or of any guarantee, embraced in or required thereby, the Contractor disturbs any work guaranteed under another contract, he shall restore such disturbed work to a condition satisfactory to the Project Manager and guarantee such restored work to the same extent as it was guaranteed under such other contracts.
4. If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Commissioner may have the defects corrected and the Contractor and his Surety shall be liable for all expense incurred.
5. All special guarantees applicable to definite parts of the work that may be stipulated in the specifications or other papers forming a part of the Contract shall be subject to the terms of this paragraph during the first year of the life of such special guarantee.

**PROSECUTION OF WORK**

Upon starting the work within the 15 days set forth by this contract, the Contractor shall prosecute the work a minimum of 8 hours daily per working day until completion, excluding breakdowns or inclement weather. If the Contractor finds it impossible to start the work as stated above, he may make a written request to the Project Manager for an extension of time. Any such request shall be made prior to expiration of the allowable 15 days, and shall contain reasons which the Contractor believes will justify the granting of his request. In his request, the Contractor shall submit his proposed starting date.

**CHANGES IN THE WORK**

The Project Manager may at any time, by a written order, and without notice to the Sureties, make changes in the Drawings and Specifications and completion date of this contract and within the general scope thereof.

In making any change, the additional cost or credit for the change shall be determined as follows:

- The order shall stipulate the mutually agreed upon lump sum price which shall be added to or deducted from the contract price. The contractor shall furnish an itemized breakdown of the prices used in computing the value of any change that might be ordered.

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- If the price change is an addition to the contract price and the work is performed by the general contractor and not a subcontractor, it shall include the contractor's indirect costs as follows: Workmen's Compensation and Employee Liability, Unemployment and Social Security Taxes.
- In addition to the above indirect costs, the general contractor shall be allowed a markup not to exceed ten percent (10%). Said ten percent (10%) shall be all inclusive for overhead, supervision, and profit. In addition to this, an allowance shall be made for performance and payment bond additional premiums.
- If the price change is an addition to the contract price and involves the work of the general contractor and subcontractor, the general contractor would be allowed ten percent (10%) on that part of the work performed by him and five percent (5%) on that part of the work performed by the subcontractor. The same percentages shall apply to subcontractors.
- On any change which involves a net credit to the Owner, no allowance for overhead and profit shall be figured.

**INSURANCE REQUIREMENTS**

**No operations under this contract shall commence unless and until certification of insurance attesting to the below listed requirements have been filed with the Commissioner, approved by the Attorney General, and the Contract approved by the Governor and Council and a Notice to Proceed is issued.**

Insurance requirements by paragraphs 1-4 below shall be the responsibility of the Prime Contractor. The Prime Contractor, at his discretion, may make similar requests of any subcontractor.

Following is the summary of minimum insurance requirements:

- 1.) Workmen's Compensation Insurance (In accordance with RSA 281-A.)
  - a. Employers' Liability
    - 1.) \$100,000 each accident
    - 2.) \$500,000 Disease-policy limit
    - 3.) \$100,000 Disease-each employee
- 2.) Commercial General Liability Insurance: Occurrence Form Policy: Include full Contractual Liability (see Indemnification Clause 9), Explosion, Collapse, and Underground coverage's:
  - a. Limits of Liability:
    - 1.) \$1,000,000 Each Occurrence Bodily injury & Property Damage
    - 2.) \$2,000,000 General Aggregate-Include per Project Aggregate Endorsement
    - 3.) \$2,000,000 Products/Completed Operations Aggregate
    - 4.) State shall be named as an additional named insured.

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- 3.) If blasting and/or demolition are required by the Contract, the Contractor or subcontractor shall obtain the respective coverage for those activities, and shall furnish to the Commissioner a certificate of Insurance evidencing the required coverage's prior to commencement of any operations involving blasting and/or demolition.
- 4.) Owner's Protective Liability coverage for the benefit of the State of New Hampshire Department of Natural and Cultural Resources.
  - a. Limits of Liability:
    - 1.) \$2,000,000 Each Occurrence
    - 2.) \$3,000,000 Aggregate
- 5.) Commercial Automobile Liability covering all motor vehicles including owned, hired, borrowed, and non-owned vehicles.
  - a. Limits of Liability:
    - 1.) \$1,000,000 Combined Single Limit for Bodily injury & Property Damage
- 6.) Commercial Umbrella Liability
  - a. Limits of Liability:
    - 1.) \$1,000,000 Each Occurrence
    - 2.) \$1,000,000 Aggregate
- 7.) Builder's Risk Insurance (Fire and Extended Coverage):

The Contractor shall insure the work included in the Contract, including extras and change orders, on an "All Risk" basis, on a one hundred percent (100%) completed value basis of the Contract, as modified. Builder's Risk coverage shall include materials located at the Contractor's premises, on-site, in-transit, and at any temporary site. The policy by its own terms or by endorsement shall specifically permit partial or beneficiary occupancy prior to completion or acceptance of the entire work. The policies shall be in the names of the State of New Hampshire Department of Natural and Cultural Resources and the Contractor. The policies shall provide for the inclusion of the names of all other Contractors, Subcontractors, and others employed on the premises as insured's. The policies shall stipulate that the insurance companies shall have no right of subrogation against any Contractors, Subcontractors or other parties employed on the premises.

- 8.) General Insurance Conditions  
Each policy shall contain a clause prohibiting cancellation or modifications of the policy earlier than thirty (30) days or ten (10) in cases of non-payment of premium after written notice thereof has been received by the State.
- 9.) Indemnification:  
The Contractor shall indemnify, defend, and hold harmless the State of New Hampshire, its Agencies, and its agents and employees from and against any and all claims, liabilities, suits or penalties arising out of (or which may be claimed to arise out of) acts of omissions of the Contractor or subcontractors in the performance of work covered by the Contract. This covenant

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shall survive the termination of the Contract. Notwithstanding the foregoing, nothing herein contained shall be deemed to constitute a waiver of the sovereign immunity of the State, which immunity is hereby reserved by the State.

**END OF SUPPLEMENTARY CONDITIONS**

**SECTION 01 10 00**

**SUMMARY**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Section includes:
1. Project information.
  2. Work covered by Contract Documents.
  3. Work sequence.
  4. Salvage requirements.
  5. Access to site.
  6. Coordination with occupants.
  7. Work restrictions.
  8. Specification and drawing conventions.
  9. Miscellaneous provisions.

**1.02 PROJECT INFORMATION**

- A. Project Identification: CAP# 2014, Toilet Building #4 Renovations
1. Project Location: Pawtuckaway State Park, 128 Mountain Rd, Nottingham NH
- B. Owner: State of New Hampshire, Department of Natural and Cultural Resources
1. Owner's Representative: Scott Coruth, Architect; 603-271-3676;  
scott.d.coruth@dnrc.nh.gov

**1.03 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The Work of Project is defined by the Contract Documents and consists of the following:
1. Demolition of the existing shower room addition and construction of a new shower room addition.
  2. Selective demolition and renovations to the existing toilet building.
  3. Addition of a new pot washing station.
  4. Building excavation and sitework.
  5. Removal and replacement of the existing septic tanks and pump station.
- B. Type of Contract: Project will be constructed under a stipulated lump sum grand total contract with the State of New Hampshire in accordance with the General Conditions of the Contract for Construction.
- C. The Contractor shall, except as otherwise specifically stated in Contract Documents, provide and pay for all materials, labor, tools, equipment, water, heat, fuel, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities or

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every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.

**1.04 WORK SEQUENCE**

- A. Work shall commence within 15 days after issuance of Notice to Proceed. Failure to comply shall constitute a Default of Contract.

**1.05 SALVAGE REQUIREMENTS**

- A. Unless otherwise indicated, demolition waste becomes the property of Contractor.
- B. Unless otherwise indicated, all equipment that must be removed due to interference with work of this contract remains the property of the Owner, and may be salvaged at Owner's discretion.
- C. Owner wishes to salvage, refurbish, and/or reuse the following materials and store and/or reinstall as itemized below. Drawings also may indicate items to be salvaged and stored on Owner's premises and the location of storage. Coordinate all salvage activities with Owner.
  - 1. Item No.1: Signage and Notice Boards
    - a. Handling: Contractor shall salvage and reinstall as indicated in the Project documents.
- D. Materials and/or items scheduled above for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The Contractor may, at his discretion and upon the approval of the owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.

**1.06 ACCESS TO SITE**

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  - 1. Limits: Limit site disturbance, including earthwork and clearing of vegetation to 40-feet beyond building perimeter; 10-feet beyond surface walkways, patios, surface parking, and utilities less than 12-inches in diameter; 15-feet beyond primary roadway curbs and main utility branch trenches; and 25-feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.
  - 2. Driveways, Walkways and Entrances: Keep driveways, loading areas and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

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- b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- D. Winter Access: In the event of winter work, the State will plow and maintain park access roads to the building site for use by the contractor. The contractor shall be responsible for the area immediately around the building site and laydown areas as required for the proper execution of the work.

**1.07 COORDINATION WITH OCCUPANTS**

- A. Full Owner Occupancy: Owner will occupy site and existing adjacent building(s) during entire construction period. Cooperate with owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without permission from Owner and approval of authorities having jurisdiction.
  - 2. Notify Owner not less than 72-hours in advance of activities that will affect Owner's operations.

**1.08 WORK RESTRICTIONS**

- A. Work restrictions, General: Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
  - 1. Access for work outside of normal working hours shall be requested in writing to the Contract Administrator, at least one week in advance. The Contract Administrator may accept or reject the request.
  - 2. No access during the following observed holidays:
    - a. New Years' Day.
    - b. Martin Luther King Jr. Civil Rights Day.
    - c. Presidents Day.
    - d. Memorial Day.
    - e. Independence Day.
    - f. Labor Day.
    - g. Veterans' Day.
    - h. Thanksgiving Day.
    - i. Day after Thanksgiving.
    - j. Christmas Day.



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- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
  - 2. Obtain Owners written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruptions to owner occupancy with owner.
  - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
  - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

**1.09 SPECIFICATION AND DRAWING CONVENTIONS**

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on drawings to identify materials and products:
  - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

**PART 2 – PRODUCTS (Not Used)**

**PART 3 – EXECUTION (Not Used)**

**END OF SUMMARY**

**SECTION 01 20 00**

**PRICE AND PAYMENT PROCEDURES**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Section Includes:
1. Schedule of Values
  2. Applications for Payment
  3. Allowances

**1.02 SCHEDULE OF VALUES**

- A. Submit printed schedule on AIA Form G703 – Continuation Sheet for G702. Contractor's standard form or electronic media printout will be considered as alternatives.
- B. Submit Schedule of Values in duplicate within 15 days after the date of issuance of Notice to Proceed. Failure to submit within specified time period will constitute Default of Contract.
- C. Utilize Schedule of Values from Section 00 41 00. Identify each line item with number and title of specification Section. Identify General Conditions, bonds and insurance.
- D. Include separate line item for the amount of each Allowance and Alternate Specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for each item.
- E. Revise schedule to list approved Change Orders, with each Application for Payment.

**1.03 APPLICATION FOR PAYMENT**

- A. Submit three copies of each application or electronic transmittal along with any supporting materials.
- B. Execute on AIA Form G702 – Application and Certificate for Payment.
- C. Items on the Application for payment shall be consistent with the items listed on the Proposal Form. Utilize Schedule of Values for listing items in Application for Payment.
- D. Submit updated construction schedule with each Application for Payment.
- E. Payment Period: Submit monthly, or as otherwise allowed by the Owner.

**1.04 ALLOWANCES**

- A. Contingency Allowances: Use the allowance only as directed by Section 00 41 00 "Bid Proposal Form".

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- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, insurance, equipment rental, and similar costs.
- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

**PART 2 – PRODUCTS (Not Used)**

**PART 3 – EXECUTION (Not Used)**

**END OF PRICE AND PAYMENT PROCEDURES**

**SECTION 01 25 00**

**SUBSTITUTION PROCEDURES**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01 20 00: Price and Payment Procedures
  - 2. SECTION 01 60 00: Product Requirements

**1.02 DEFINITIONS**

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

**1.03 ACTION SUBMITTALS**

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or installation cannot be provided.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparisons of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - e. Samples, where applicable or requested.
    - f. Certificates and qualification data, where applicable or requested.

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

#### **1.04 QUALITY ASSURANCE**

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

#### **1.05 PROCEDURES**

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

### **PART 2 – PRODUCTS**

#### **2.01 SUBSTITUTIONS**

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

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1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
  - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - b. Requested substitution provides sustainable design characteristics that specified product provided.
  - c. Substitution request is fully documented and properly submitted.
  - d. Requested substitution will not adversely affect Contractor's construction schedule.
  - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - f. Requested substitution is compatible with other portions of the Work.
  - g. Requested substitution has been coordinated with other portions of the Work.
  - h. Requested substitution provides specified warranty.
  - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

**PART 3 – EXECUTION (Not Used)**

**END OF SUBSTITUTION PROCEDURES**

**SECTION 01 26 00**

**CONTRACT MODIFICATION PROCEDURES**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01 20 00: Price and Payment Procedures
  - 2. SECTION 01 25 00: Substitution Procedures
  - 3. SECTION 01 30 00: Administrative Requirements

**1.02 MINOR CHANGES IN THE WORK**

- A. Architect will issue supplemental instructions (SI) authorizing minor changes in Work, not involving adjustment to the Contract Sum or the Contract Time.

**1.03 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 Specification.
  - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified by Proposal Request or 14 days, when not otherwise specified, 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 time before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for change to Architect.

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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 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 indicated effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available float time before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

**1.04 CHANGE ORDER PROCEDURES**

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Contract Change Order for signatures of Owner and Contractor on Owner's standard form.

**1.05 CONSTRUCTION CHANGE DIRECTIVE**

- A. Construction Change Directive: Architect may issue a Construction Change Directive on Architects standard form. Construction Change Directive instructs Contractor to proceed with a change in 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 Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and materials 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 CONTRACT MODIFICATION PROCEDURES**



**SECTION 01 30 00**

**ADMINISTRATIVE REQUIREMENTS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Section includes administrative provisions for coordinating construction operations, submittal procedures, delegated design, and Contractor's construction schedule including, but not limited to, the following:
1. Project management and coordination
  2. Submittal procedures
  3. Delegated design
  4. Construction schedule
- B. Related Work Specified Elsewhere:
1. SECTION 01 70 00: Execution and Closeout Requirements

**1.02 PRECONSTRUCTION CONFERENCE**

- A. Soon after the actual award of the Contract (but in any event prior to the start of construction), the Contractor or his representative and his principal subcontractors shall attend a preconstruction conference with representatives of the Owner. The conference will serve to acquaint the participants with the general plan of contract administration and requirements under which the construction operation is to proceed.

**1.03 PROJECT MANAGEMENT AND COORDINATION**

- A. Subcontract List: Submit a written summary identifying individuals or firms proposed for each portion of the Work.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. List e-mail addresses and telephone numbers.
- C. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.
- D. Requests for Information (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. Use forms acceptable to Architect.
- E. Schedule and conduct progress meetings at Project site at biweekly intervals. Notify Owner of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities.

1. Contractor will record minutes and distribute to all attendees, including Owner/Architect.

**1.04 SUBMITTAL ADMINISTRATIVE REQUIREMENTS**

- A. Architect's Digital Data Files: Requests for Electronic digital data files of the Contract Drawings will be considered on a case by case basis and documents may be provided by Architect for Contractor's use in preparing submittals. Contractor is to submit request for specific drawing file pertinent to shop drawing preparation.
1. Architect may furnish Contractor specific digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
    - a. The decision to provide digital file data is at the sole discretion of the architect. No damages or claims will be accepted for failure to provide requested digital data.
    - b. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    - c. Contractor shall execute a liability release and/or data licensing agreement in the form acceptable to the Architect.
- B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
1. 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.
  2. Architect will discard submittals received from sources other than Contractor.
- C. Paper Submittals: Place a permanent label or title block on each submittal for identification. Provide a space approximately on label or beside title block to record Contractor's review and approval markings and action taken by Architect. Include the following information on the label:
1. Project name.
  2. Date.
  3. Name and address of Contractor.
  4. Name and address of subcontractor or supplier.
  5. Number and title of appropriate Specification Section.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with unique identifier, including project identifier, Specification Section number, and revision identifier.
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

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- E. Identify options requiring selection by Architect.
- F. Identify deviations from the Contract Documents on submittals.
- G. Contractor's Construction Schedule Submittal Procedure:
  - 1. Submit required submittals in the following format:
    - a. Working electronic copy of schedule file, where indicated.
    - b. PDF electronic file
    - c. Three paper copies.
  - 2. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 3. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

**PART 2 – PRODUCTS**

**2.01 SUBMITTAL PROCEDURES**

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections.
  - 1. Submit electronic submittals via email as PDF electronic files.
- B. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

**2.02 ACTION SUBMITTALS**

- A. Submit two paper copies of each submittal unless otherwise indicated. Architect will return one copy.
- B. Product Data: Mark each copy to show applicable products and options. Include the following:
  - 1. Manufacturer's written recommendations, product specifications, and installation instructions.
  - 2. Wiring diagrams showing factory-installed wiring.
  - 3. Printed performance curves and operational diagrams.
  - 4. Testing by recognized testing agency.
  - 5. Compliance with specified standards and requirements.
- 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. Submit on sheets at least 8-1/2 by 11-inches but not larger than 24 by 36-inches. Include the following:
  - 1. Dimensions and identification of products.

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2. Fabrication and installation drawings and roughing-in and setting diagrams.
  3. Wiring diagrams showing field-installed wiring.
  4. Notation of coordination requirements.
  5. Notation of dimensions established by field measurement.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture and for comparison of these characteristics between submittal and actual component as delivered and installed. Include name of manufacturer and product name on label.
1. If variation is inherent in material or product, submit at least three sets of paired units that show variations.

**2.03 INFORMATIONAL SUBMITTALS**

- A. Informational Submittals: Submit two copies of each submittal unless otherwise indicated. Architect will return one copy.
- B. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

**2.04 DELEGATED DESIGN SERVICES**

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit four 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.

**2.05 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, schedule in the format outlined in the General Conditions.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

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- C. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
- D. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew size, and equipment required to achieve compliance, and indicate date by which recovery will be accomplished.

**PART 3 – EXECUTION**

**3.01 SUBMITTAL 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. Architect will review each action submittal, make marks to indicate corrections or modification required, will signify each submittal with an action stamp, and will signify appropriately to indicate action.
- C. Informational Submittals: Architect will review each submittal and will return a copy. Architect will forward each submittal to appropriate party.
- D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

**3.02 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule a minimum of one day before each regularly scheduled progress meeting.
  - 1. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribute copies of approved schedule to Owner/Architect, subcontractors, testing and inspecting agencies, and parties identified by Contractor with a need-to-know schedule responsibility. When revisions are made, distribute updated schedules to the same parties.

**END OF ADMINISTRATIVE REQUIREMENTS**

**SECTION 01 40 00**

**QUALITY REQUIREMENTS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- 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 address those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related activities 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.

**1.02 CONFLICTING REQUIREMENTS**

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

**1.03 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.

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- 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 installation of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specification 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. Mockups: Before installing portions of the Work requiring mockups, build mockups for each 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/Engineer 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/Engineer's approval of mockups before starting work, fabrication, or construction.
  - 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.

**1.04 QUALITY CONTROL**

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. 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.
- C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.
- D. 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.
- E. 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. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspection.
  3. Adequate quantities of representative sample of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage of test samples.
  5. Delivery of samples to testing agencies.
- F. 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.

**1.05 SPECIAL TESTS AND INSPECTIONS**

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



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1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notify 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**

**3.03 REPAIR AND PROTECTION**

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with Contract Document requirements for cutting and patching in Section 01 70 00 "Execution and Closeout Requirements."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

**END OF QUALITY REQUIREMENTS**

**SECTION 01 50 00**

**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Use charges
    - b. Temporary utilities
    - c. Construction facilities
    - d. Temporary controls
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01 26 00: Contract Modification Procedures
  - 2. SECTION 01 70 00: Execution and Closeout Requirements

**1.02 USE CHARGES**

- A. General: Installation and removal of 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, Engineers, occupants of Project, testing agencies, and authorities having jurisdiction.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

**1.04 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.

**1.05 PROJECT CONDITIONS**

- A. The Contractor shall be permitted to utilize the existing Owner utilities at the site as limited by specific notes in the bidding documents. These utilities include electric power and water. The Contractor shall provide temporary sanitary facilities for the workmen, temporary cell phones and temporary fire safety devices such as fire extinguishers.

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

**PART 2 – PRODUCTS**

**2.01 TEMPORARY FACILITIES**

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

**2.02 EQUIPMENT**

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

**PART 3 – EXECUTION**

**3.01 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.
- 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.

**3.02 TEMPORARY UTILITY INSTALLATION**

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities. Permanent sanitary facilities installed under this Contract shall not be used during construction.
- D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installation or for protecting installed construction from adverse

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effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installation or elements being installed.

- 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 installation or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- F. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

**3.03 SUPPORT FACILITIES INSTALLATION**

- A. General: Comply with the following:
  - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30-feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
  - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

**3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION**

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in manner that will prevent people and animals from easily entering site except by entrance gate.
- D. Barricades, Warning Signs, and Lights: Comply with authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

**3.05    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.     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.

**END OF TEMPORARY FACILITIES AND CONTROLS**

**SECTION 01 60 00**

**PRODUCT REQUIREMENTS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Section includes administrative and procedural requirements for selection of products for use in Project.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Product delivery, storage, and handling
    - b. Manufacturers' standard warranties
    - c. Special warranties
    - d. Comparable products
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01 20 00: Price and Payment Procedures
  - 2. SECTION 01 25 00: Substitution Procedures

**1.02 DEFINITIONS**

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

**1.03 ACTION SUBMITTALS**

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- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and drawing numbers and titles. Note that no substitutions for convenience are allowed per Section 01 25 00.
1. Include data to indicate compliance with the requirements specified in “Comparable Products” Article.
  2. Architect’s Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
    - a. Form of Approval: As specified in Section 01 30 00 “Administrative Requirements.”
    - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 30 00 “Administrative Requirements.”

**1.04 QUALITY ASSURANCE**

- A. Compatibility of Options: If contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer’s written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  3. Deliver products to Project site in an undamaged condition in manufacturer’s original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.

2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by owner's construction forces. Coordinate location with owner.

#### **1.06 PRODUCT WARRANTIES**

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to owner.
  2. Special Warranty: Written warranty required by Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
- a. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - b. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  - c. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 70 00 "Execution and Closeout Requirements."

### **PART 2 – PRODUCTS**

#### **2.01 PRODUCT SELECTION PROCEDURES**

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.



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3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term “as selected”, Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor’s convenience will not be considered.
  2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor’s convenience will not be considered.
  3. Products:
    - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements.
  4. Manufacturers:
    - a. Restricted List: Where Specifications include a list of manufacturers’ names, provide a product by one of the manufacturers listed that complies with requirements.
  5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers and/or products, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product names. Comply with requirements in “Comparable Products” Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require “match Architect’s sample”, provide a product that complies with requirements and matches Architect’s sample. Architect’s decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 “Substitution Procedures” for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase “as selected by Architect from manufacturer’s full range” or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer’s product line that includes both standard and premium items.

**2.02 COMPARABLE PRODUCTS**

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable products when the following conditions are satisfied. Note that substitutions for convenience are not allowed per Section 01 25 00. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.

**PART 3 – EXECUTION (Not Used)**

**END OF PRODUCT REQUIREMENTS**

**SECTION 01 70 00**

**EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Section includes general administrative and procedural requirements governing execution and closeout of the Work including, but not limited to, the following:
  - 1. Execution
  - 2. Cutting and patching
  - 3. Cleaning
  - 4. Closeout procedures
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01 10 00: Summary
  - 2. SECTION 01 30 00: Administrative Requirements

**1.02 EXECUTION REQUIREMENTS**

- A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- B. Cutting and Patching:
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching.
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
  - 3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the buildings aesthetic qualities.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

**1.03 CLOSEOUT SUBMITTALS**

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.
- C. Operation and Maintenance Data: Submit two copies of manual.

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- D. PDF Electronic File: Assemble manual into a composite electronically indexed file. Submit on digital media.
- E. Record Drawings: Submit two set of marked-up record prints.
- F. Record Product Data: Submit one paper copy and one annotated PDF electronic files and directories of each submittal.

**1.04 SUBSTANTIAL COMPLETION PROCEDURES**

- A. 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.
- B. Submittals Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
  - 1. Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Sections, including project record documents, operation and maintenance manuals, property surveys, similar final record information, warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 3. Submit maintenance material submittals specified in other Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect.
  - 4. Submit test/adjust/balance records.
  - 5. Submit Changeover information related to owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
  - 1. Advise owner of pending insurance changeover requirements.
  - 2. Make final changeover of permanent locks and deliver keys to Owner.
  - 3. Complete startup and testing of systems and equipment.
  - 4. Perform preventative maintenance of equipment prior to Substantial Completion.
  - 5. Advise owner of changeover in heat and other utilities.
  - 6. Participate with owner in conducting inspection and walkthrough with local emergency responders.
  - 7. Remove temporary facilities and controls.
  - 8. Complete final cleaning requirements, including touchup painting.
  - 9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

## **1.05 FINAL COMPLETION PROCEDURES**

- A. Submittals Prior to Final Completion: Before requesting inspection for determining final completion, complete the following:
  - 3. Submit a final Application for Payment.
  - 4. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list). Certified copy of the list shall state that each item has been completed or otherwise resolved.
  - 5. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Submit a written request for final inspection and acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items 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.

## **PART 2 – PRODUCTS**

### **2.01 MATERIALS**

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
- B. 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.

### **2.02 OPERATION AND MAINTENANCE DOCUMENTATION**

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize manuals into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system.
- C. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:
  - 1. Manufacturer's operation and maintenance documentation.
  - 2. Maintenance and service schedules.
  - 3. Maintenance service contracts. Include name and telephone number of service agent.
  - 4. Emergency instructions.

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5. Spare parts list and local source of maintenance materials.
6. Wiring diagrams.
7. Copies of warranties. Include procedures to follow and required notifications for warranty claims.

**2.03 RECORD DRAWINGS**

- A. Record Prints: Maintain a set of prints of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modification are issued. Mark to show actual installation where installation varies from that shown originally. Accurately record information in an acceptable drawing technique.
1. Record drawings are to be updated at a minimum weekly.
  2. Review markings with Architect and Owner at Project Meetings.
  3. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect.

**PART 3 – EXECUTION**

**3.01 EXAMINATION AND PREPARATION**

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
1. Comply with the "Underground Utility Damage Prevention System" per NH RSA 374 by notification to DIG-SFAE SYSTEM, Inc., of intent to excavate within 100 feet of an underground utility. Contact DIG-SAFE at least seventy-two (72) hours in advance of starting any excavation.
- B. Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.
1. Verify compatibility with and suitability of substrates.
  2. Examine roughing-in for mechanical and electrical systems.
  3. Examine walls, floors, and roofs for suitable conditions.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.
- E. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

**3.02 CONSTRUCTION LAYOUT AND FIELD ENGINEERING**

- A. Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks.
- B. Engage a land surveyor to lay out Work using accepted surveying practices.
- C. Engage a land surveyor to prepare a final property survey showing significant features (real property) for project and finish floor elevations.
  - 1. At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

**3.03 INSTALLATION**

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and horizontal work level.
  - 2. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 3. Maintain minimum headroom clearance of 96-inches in occupied spaces and 90-inches in unoccupied spaces, unless otherwise noted.
- B. Comply with manufacturer's written instructions and recommendations.
- C. 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.
- D. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.
- E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Where size and type of attachments are not indicated, verify size and type required for load conditions.
- F. Joints: Make joints uniform in 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.
- G. Use products, cleaners, and installation materials that are not considered hazardous.

**3.04 CUTTING AND PATCHING**

- A. 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.

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- C. Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- D. Cutting: Cut in-place construction using methods least likely to damage elements retained or adjoining construction.
  - 1. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
- E. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
  - 1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.
  - 2. 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.
  - 3. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.

**3.05 CLEANING**

- A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.
  - 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.
  - 3. Remove debris from concealed spaces before enclosing space.
- B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:
  - 1. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
  - 2. Remove labels that are not permanent.
  - 3. Clean transparent materials, including mirrors. Remove excess glazing compounds.
  - 4. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
  - 5. Vacuum carpeted surfaces and wax resilient flooring.
  - 6. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and foreign substances. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.
  - 7. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

**3.06 OPERATION AND MAINTENANCE MANUAL PREPARATION**



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- A. 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.
- B. Manufacturer's 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 unavailable and where the information is necessary for proper operation and maintenance of equipment or systems.
- C. 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.

**3.07 DEMONSTRATION AND TRAINING**

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include detailed review of the following:
  - 1. Include instructions for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

**END OF EXECUTION AND CLOSEOUT REQUIREMENTS**

**SECTION 02 41 19**

**SELECTIVE DEMOLITION**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to provide all Selective Demolition as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.

The Work of this Section is not necessarily fully represented on the Drawings or specifically identified herein. The Contractor, either himself or through his various subcontractors, shall thoroughly review all documents and shall visit the site and existing building prior to bidding, as required to fully satisfy himself as to the types, locations and quantities of demolition work required for the complete and proper execution of the Work. No pleas of misunderstanding resulting from failure to adequately inspect existing conditions will be entertained and no additional expenses related thereto will be granted.

1. The Work shall include, but shall not necessarily be limited to:
  - a. Demolition of designated site improvements including paving, curbing, site walls, and utility structures.
  - b. Demolition of below-grade foundations and site improvements to depth to avoid conflict with new construction or site work.
  - c. Salvage of designated items
  - d. Protection of site work and adjacent items
  - e. Disconnection, capping, and removal of utilities
  - f. Pollution control during building and selective demolition, including noise control
  - g. Selective demolition of interior partitions, systems, and building components designated to be removed.
  - h. Selective demolition of exterior façade, structures, and components designated to be removed.
  - i. Protection of portions of building adjacent to or affected by selective demolition
  - j. Removal of abandoned utilities and wiring systems
  - k. Notification to Owner of schedule of shut-off of utilities which serve occupied spaces.
  - l. Removal and legal disposal of materials
  - m. Protection of designated site improvements and adjacent construction
  - n. Interruption, capping or removal of utilities as applicable

**1.02 DEFINITIONS**

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

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- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

**1.03 MATERIALS OWNERSHIP**

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

**1.04 SUBMITTALS**

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.
- D. Closeout Submittals: Submit a list of items that have been removed and salvaged.

**1.05 QUALITY ASSURANCE**

- A. Codes and Regulations: Comply with governing codes and regulations. Use experienced workers.

**1.06 PROJECT CONDITIONS**

- A. Owner will occupy portions of site adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

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- C. Notify Owner of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

**1.07 COORDINATION**

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

**PART 2 – PRODUCTS**

**2.01 PERFORMANCE REQUIREMENTS**

- A. Regulatory Requirements: Comply with governing EPA notification regulation before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
  - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

- E. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs or video.

### **3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS**

- A. Existing Services/Systems to Remain: Maintain services/systems to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. Arrange to shut off utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building and site.
  - 4. Disconnect, demolish, and remove plumbing and HVAC systems, equipment, and components indicated on Drawings to be removed.
    - a. Piping to be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    - c. Equipment to be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

### **3.03 PROTECTION**

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of site.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

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1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

**3.04 SELECTIVE DEMOLITION, GENERAL**

- A. General: Demolish and remove existing construction only to extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  5. Maintain fire watch during and for at least two hours after flame-cutting operations.
  6. Maintain adequate ventilation when using cutting torches.
  7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose off-site.
  8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  10. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
  2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  3. Protect items from damage during transport and storage.
  4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Owner, 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.

### **3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS**

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4-inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Concrete Slabs-On-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 07 31 13 "Asphalt Shingles" for new roofing requirements.

### **3.06 DISPOSAL OF DEMOLISHED MATERIALS**

- A. Remove demolition waste materials from Project site and recycle or dispose of them.
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  - 3. 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. Burning: Do not burn demolished materials.

### **3.07 CLEANING**

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

**END OF SELECTIVE DEMOLITION**

**SECTION 03 30 00**

**CAST-IN-PLACE CONCRETE**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Cast-In-Place Concrete as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Cast-In-Place Concrete
    - b. Formwork
    - c. Reinforcement
    - d. Materials, mixture design, placement and finishes
- B. Related Work Specified Elsewhere:
  - 1. SECTION 07 92 00: Joint Sealants

**1.02 REFERENCES (LATEST EDITIONS)**

- A. ASTM listed standards by the American Society for Testing and Materials.
- B. ACI listed standards by the American Concrete Institute.
- C. CRSI listed standards by the Concrete Reinforcing Steel Institute.

**1.03 ACTION 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. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - 1. Location of joints is subject to approval of the Architect.



**1.04 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer and testing agency.
- B. Affidavit: Submit, upon request by Architect, manufacturer's, suppliers and installer's affidavit stating that material or product provided complies with Contract Documents.
- C. Material Test Reports: For the following, from a qualified testing agency:
  - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- E. Field quality-control reports.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified installer who employs on the Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturers Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CP-1, or an equivalent certification program.
  - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D1.4 M, "Structural Welding Code – Reinforcing Steel."

**1.06 DELIVERY, STORAGE AND HANDLING**

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

## **1.07 PROJECT CONDITIONS**

- A. 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 action, 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.
- B. Hot-Weather Placement: Comply with ACI 301 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.

## **PART 2 – PRODUCTS**

### **2.01 FORM-FACING MATERIALS**

- A. Provide form-facing panels as defined by ACI and as required to achieve the specified Surface Finish and Surface Tolerance Class.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- C. 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.
- D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic or metal 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 surfaces.
  2. Furnish ties that, when removed, will leave holes no larger than 1-inch in diameter in concrete surfaces.
  3. Furnish ties with integral water-barrier plates to wall indicated to receive dampproofing or waterproofing.

### **2.02 STEEL REINFORCEMENT**

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- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82/A 82M, as-drawn.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

**2.03 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.

**2.04 CONCRETE MATERIALS**

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Material:
  - 1. Portland Cement: ASTM C 150, Type I or Type II, gray.
  - 2. Fly Ash: ASTM C618, Class F or C.
  - 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
- C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: 3/4-inch nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. 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. Air-Entraining Admixture: ASTM C260/C260M
  - 2. Water-Reducing Admixture: ASTM C494/C494M, Type A.
  - 3. Mid-Range Water-Reducing Admixture: ASTM C49/C494M, Type A.
  - 4. Retarding Admixture: ASTM C494/C494M, Type B.
  - 5. Accelerating Admixture: ASTM C494/C494M, Type C.
  - 6. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
  - 7. Hydration-Control Admixture: ASTM C494/C494M, Type D.
  - 8. Water-Reducing and Accelerating Admixture: ASTM C494/C494M, Type E.

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9. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
10. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
11. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

E. Water: ASTM C 94/C 94M.

**2.05 VAPOR RETARDERS**

A. Sheet Vapor Retarder: ASTM E 1745, Class A, except with maximum perm rating of 0.01 as tested after mandatory conditioning (ASTM E 154 sections 8, 11, 12, 13). Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. W.R. Meadows, Inc.; Perminator 15 mil.
  - b. Stego Industries, LLC; Stego Wrap 15 mil Class A.

**2.06 LIQUID FLOOR TREATMENTS**

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. MasterKure HB 200WB by BASF Corporation.
  - b. Curecrete Distribution Inc.; Ashford Formula.
  - c. Euclid Chemical Company (The), and RPM Company; Euco Diamond Hard.
  - d. L&M Construction Chemicals, Inc.; Seal Hard.
  - e. W.R. Meadows, Inc.; LIQUI-HARD.

**2.07 CURING MATERIALS**

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Moisture-Retaining Cover: AASHTO M-182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 10 oz./sq. yd. when dry.
- C. Water: Potable.

**2.08 RELATED MATERIALS**

- A. Expansion and Isolation Joint-Filler Strips: ASTM D1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- C. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## **2.09 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.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by mass, of cementitious materials other than Portland cement in concrete as follows:
  - 1. Fly Ash: 15 percent.
  - 2. Slag Cement: 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by mass 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 accelerating or water-reducing and accelerating admixture when required by low temperatures, or other adverse winter placement conditions.
  - 4. Use water-reducing admixture in pumped concrete, concrete to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

## **2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS**

- A. Footings and Foundation Walls: Normal-weight concrete.
  - 1. Minimum Compressive Strength: 3000 psi at 28 days.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
  - 3. Slump Limit: 4 inches, or, 8 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: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
- B. Slabs-on-Ground (Floated Finish): Normal-weight concrete mixture.

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1. Minimum Compressive Strength: 3000 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.45.
  3. Minimum Cementitious Materials Content: 540 lb/cu. yard.
  4. Slump Limit: 4 inches, or, 8 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.
  5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
- C. Slabs-on-Ground (Troweled Finish): Normal-weight concrete mixture.
1. Minimum Compressive Strength: 4000 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.45.
  3. Minimum Cementitious Materials Content: 540 lb/cu. yard.
  4. Slump Limit: 4 inches, or, 8 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.
  5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
  6. Prohibit the use of fly ash and slag cement.

**2.11 FABRICATING REINFORCEMENT**

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

**2.12 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, 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**

**3.01 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 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch for all surfaces exposed to view.
  2. Class C, 1/2 inch for other concrete surfaces.

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- 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 concrete 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.

**3.02 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."

**3.03 REMOVING AND REUSING FORMS**

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support the weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

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1. Leave formwork for slabs and other structural elements that supports weight of concrete in place until concrete has achieved at least 70-percent of its 28-day design compressive strength.
  2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- 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.

**3.04 SHORES AND RESHORES**

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. Plan sequence of removal of shores and reshores to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

**3.05 VAPOR RETARDERS**

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

**3.06 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 reinforcement 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. Offset



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laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

**3.07 JOINTS**

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints in Slabs-On-Grade: Form weakened-plane contraction joints, sectioning concrete into areas 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 an early-entry power saw using a dry-cut blade. Use a vacuum attached to the saw to remove saw cut residue. Cut 1/8-inch wide joints to a depth of one fourth of the concrete thickness into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- C. 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.
  - 1. 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 Section 07 92 00 "Joint Sealants," are indicated.
  - 2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

**3.08 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 side, 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 not to 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.

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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 proceeding 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. Screed 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 surface. Do not further disturb slab surfaces before starting finishing operations.

**3.09 FINISHING FORMED SURFACES**

- A. As-Cast Finishes: Provide As-Cast finishes per ACI 301 and amended below:
1. Surface Finish-1.0 (SF-1.0)
    - a. Patch voids larger than 1-1/2 inch wide or 1/2 inch deep
    - b. Remove projections larger than 1 inch
    - c. Tie holes need not be patched
    - d. Surface tolerance Class D (1-inch within 5 Ft.)
    - e. Mockup not required
  2. Surface Finish-2.0 (SF-2.0)
    - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep
    - b. Remove projections larger than 1/4 inch
    - c. Patch tie holes
    - d. Surface tolerance Class B (1/4-inch within 5 Ft.)
    - e. Provide mockup
- B. Rubbed Finish: Apply the following to as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or other abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- C. Finish Schedule: Except as otherwise indicated on the Drawings, provide the finishes below:
1. Surfaces entirely concealed from view (Ex. Inside face of frost walls, etc.): SF-1.0 with As-Cast Finish
  2. Surfaces exposed to view (Ex. Exposed portion of frost walls): SF-2.0 with As-Cast Finish
  3. Exterior surfaces fully exposed to view (Ex. Stairs, fully exposed foundation walls): SF-1.0 with Smooth-Rubbed Finish

- 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.
- 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 or trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings of floor coverings.
1. 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-ground
  2. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-foot long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4-inch.
- D. Broom Finish: 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.
- E. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:
1. Floated Finish for:
    - a. Treads and platforms of exterior steps and stairs.
    - b. Slabs and fills over which waterproofing, roofing, vapor barrier, insulation, terrazzo, or resin bound flooring is required.
  2. Troweled Finish for:
    - a. Interior slabs that are exposed to view.
    - b. Slabs and fills over which resilient wood flooring, resilient tile or sheet flooring, carpet, or thin-film coating system is required.
    - c. Slabs and fills over which thin-set ceramic tile is required, except fine-broom finished surface.
    - d. Treads and platforms of interior steps and stairs.
  3. Broom Finish for:
    - a. Exterior slabs. Texture as approved by Architect.

### **3.11 MISCELLANEOUS CONCRETE ITEMS**

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- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. 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 305 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 0.1 lb/sq. ft. x h before and during finishing operations. Apply in accordance with 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. Curing Schedule: Curing compounds shall not be permitted prior written approval of Architect.
    - a. Vertical Concrete: Moisture Cure
    - b. Concrete surfaces to receive floor covering: Moisture Cure
    - c. Concrete surfaces to receive liquid floor treatment: Moisture Cure

**3.13 LIQUID FLOOR TREATMENTS**

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

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1. Remove sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

**3.14 CONCRETE SURFACE REPAIRS**

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances, finishing or other specified requirements. Repair and patch or replacement of defective concrete will be determined by the Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.
- C. 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.
- D. 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. Repair defects on exposed formed surfaces as required to meet the specified as-cast Surface Finish.
  2. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- E. 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 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.
  5. 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 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.

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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.

6. 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.
  7. See Section 03 35 43 Polished Concrete Finishing for additional information on patching concrete to receive a polished finish.
- F. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- G. Repair materials and installation not specified above may be used, subject to Architect's approval.

**3.15 FIELD QUALITY CONTROL**

- A. Testing and Inspecting: Contractor will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
1. Steel reinforcement placement.
  2. Headed bolts and studs.
  3. Verification of use of required design mixture.
  4. Concrete placement, including conveying and depositing.
  5. Curing procedures and maintenance of curing temperature.
  6. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. 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 50 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof. All samples shall be taken at the point of placement.
  2. Slump: ASTM C143/C143M; 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 C231, 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 C1064/C1064M; 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 C31/C31M.

- a. Cast and laboratory cure four 6- by 12-inch or five 4- by 8-inch cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C39/C39M.
    - a. A compressive-strength test shall be the average compressive strength from a set of two 6- by 12-inch or three 4- by 8-inch specimens obtained from same composite sample and tested at age indicated.
    - b. Test cylinders at 7 days and at 28 days.
  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 ( $f_c'$ ) and no compressive-strength test value falls below  $f_c'$  by more than 500 psi when  $f_c'$  is below 5000 psi or by more than 0.10  $f_c'$  when  $f_c'$  is more than 5000 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: Rebound hammer, ultrasonic, 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 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 C42/C42M 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.
- D. Measure floor and slab flatness and levelness according to ASTM E1155 within 24 hours of finishing.
- E. Prepare test and inspection reports.

3.16 **PROTECTION**

- A. Protect liquid floor treatment from damage and wear during remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments Installer.

**END OF CAST-IN-PLACE CONCRETE**

**SECTION 05 52 13**

**PIPE AND TUBE RAILINGS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Pipe and Tube Railings as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Steel pipe and tube railings

**1.02 ACTION SUBMITTALS**

- A. Product Data: For the following:
  - 1. Steel pipe for use as railings.
  - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the licensed structural engineer responsible for their preparation.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.
- B. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.

**1.04 QUALITY ASSURANCE**

- A. Manufacturers Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years' experience.
- B. Installer Qualifications: All products in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code – Steel."

**1.05 DELIVERY, STORAGE AND HANDLING**



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- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

**1.06 PROJECT CONDITIONS**

- A. Field Measurements: Where handrails and railings are indicated to fit other construction, check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings.

**1.07 WARRANTY**

- A. Provide manufacturer's standard limited warranty against manufacturing defects, outlining its terms, conditions, and exclusions from coverage.

**PART 2 – PRODUCTS**

**2.01 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Engage a licensed structural engineer to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
    - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
    - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

**2.02 METALS, GENERAL**

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

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- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
  - 1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

**2.03 STEEL AND IRON**

- A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- B. 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.
  - 1. Provide color galvanized finish for exterior installations and where indicated.
- C. Plates, Shapes, and bars: ASTM A 36/A 36M.

**2.04 FASTENERS**

- A. General: Provide the following:
  - 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. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- 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.

**2.05 MISCELLANEOUS MATERIALS**

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Etching Cleaner for Galvanized Metal: Comply with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint system indicated.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

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- F. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at project site to create pourable anchoring, patching, and grouting compound.
  - 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

**2.06 FABRICATION**

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings 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. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including 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.
- I. Form Changes in Direction as Follows:
  - 1. As detailed.
  - 2. By bending or by inserting prefabricated elbow fittings.
  - 3. By flush bends or by inserting prefabricated flush-elbow fittings.

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- J. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- K. Close exposed ends of railing members with prefabricated end fittings.
- L. For railing posts set in concrete, provide stainless-steel sleeves not less than 6 inches long with inside dimensions not less than ½ inch greater than outside dimensions of post, with metal plate forming bottom closure.

**2.07 FACTORY APPLIED ARCHITECTURAL FINISH OVER GALVANIZED STEEL**

- A. The following miscellaneous metal fabrications shall receive factory applied architectural finish over hot-dip galvanizing:
  - 1. All exterior rails
- B. Basis-of-Design: Colorgalv by Duncan Galvanizing.
- C. Primer coat shall be factory-applied polyamide epoxy primer. Apply primer within 12 hours after galvanizing at the same galvanizer's plant in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer.
- D. Finish coat shall be factory-applied color-pigmented architectural finish. Apply finish coating at the galvanizer's plant, in a controlled environment meeting applicable environmental regulations and as recommended by the finish coating manufacturer.
- E. Coatings shall be certified OTC/VOC compliant and conform to applicable regulations and EPA standards.
- F. Apply the galvanizing, primer, and coating within the same facility and provide single-source responsibility for galvanizing, priming and finish coating.
- G. Clean galvanized surface to create an acceptable profile for coatings. Galvanizer shall certify that performance will be met without blast cleaning and coating will be applied within 12 hours of galvanizing at the galvanizer's plant. If blasted, galvanizer shall certify that rugosity standards are met.
- H. Primer shall meet or exceed the following performance criteria:
  - 1. Abrasion Resistance: ASTM D 4060 (CS17 Wheel, 1,000 grams load) 1 kg load, 200 mg loss.
  - 2. Adhesion: ASTM D 4541, 1050 psi.
  - 3. Corrosion Weathering: ASTM D 5894, 13 cycles, 4,368 hours, 10 per ASTM D 714 for blistering; 7 per ASTM D 610 for rusting.
  - 4. Direct Impact Resistance: ASTM D 2794, 160 in. lbs.
  - 5. Flexibility: ASTM D 522, 180 degrees bend, 1 inch mandrel, Passes.
  - 6. Pencil Hardness: ASTM D 3363, 3H.

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7. Moisture Condensation Resistance: ASTM D 4585, 100 degrees F, 2000 hours, Passes no cracking or delamination.
  8. Dry Heat Resistance: ASTM D 2485, 250 degrees F.
  9. Accelerated Weathering: QUV- ASTM D 4587 QUV A 5000 Hours: Passes.
  10. Salt Fog Resistance: ASTM B 117, 5,600 hours No cracking or blisters.
- I. Topcoat shall meet or exceed the following performance criteria:
1. Abrasion Resistance: ASTM D 4060, CS17 Wheel, 1,000 cycles 1 kg load, 87.1 mg loss.
  2. Adhesion: ASTM D 4541, 1050 psi.
  3. Direct Impact Resistance: ASTM D 2794, greater than 28 in. pounds.
  4. Dry Heat Resistance: ASTM D 2485, 200 degrees F (93 C).
  5. Salt Fog Resistance: ASTM B 117 9,000 hours, Rating 10 per ASTM D 714 for blistering, Rating 9 per ASTM D 610 for rusting.
  6. Flexibility: ASTM D522, 180 degrees bend, 1/8 inch mandrel, Passes.
  7. Pencil Hardness: ASTM D 3363, F.
  8. Moisture Condensation Resistance: ASTM D 4585, 100 degrees F, 1000 hours, No blistering or delamination.
  9. Xenon Arc Test: ASTM D 4798, Pass 200 hours.
  10. Corrosion Weathering: ASTM D 5894, 21 Cycles, 7056 Hours: Rating 10 per ASTM D714 for blistering. Rating 9 per ASTM D 610 for Rusting.
  11. Thermal Shock: ASTM D 2246, 15 cycles, Excellent.
- J. Topcoat shall exhibit a rugosity (smoothness) 4 rug or less (16-20 microns of variation) when measured by a profilometer over a 1 inch straight line on the surface of elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments.
- K. Warranty: Provide galvanizer's standard warranty that materials will be free from 10 percent or more visible rust for 20 years.

### **PART 3 – EXECUTION**

#### **3.01 INSTALLATION, GENERAL**

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment and elevation; measured from established lines and levels and free of rack.
1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  3. 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. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum or steel that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

### **3.02 ANCHORING POSTS**

- A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with 1/8 inch buildup, sloped away from post.

### **3.03 ADJUSTING AND CLEANING**

- A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.
- B. 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 requirements for touching up shop-painted surface.
  1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

### **3.04 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.

**END OF METAL RAILINGS**

**SECTION 06 10 00**

**ROUGH CARPENTRY**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Rough Carpentry as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job. It is not intended that this Section specifically identify all Rough Carpentry required.
1. The Work shall include, but shall not necessarily be limited to:
- a. Framing with dimensional lumber
  - b. Framing with timber
  - c. Wood blocking, cants, and nailers
  - d. Wood underlayment, decking and sheathing
  - e. Anchors and fasteners
- B. Related Work Specified Elsewhere:
- 1. SECTION 06 20 00: Finish Carpentry
  - 2. SECTION 07 60 00: Flashing and Sheet Metal
  - 3. SECTION 08 71 00: Door Hardware
  - 4. SECTION 10 14 00: Signage
  - 5. SECTION 10 21 00: Compartments and Cubicles
  - 6. SECTION 10 28 00: Toilet, Bath and Laundry Specialties

**1.02 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. Timber: Lumber of 5 inches nominal or greater in least dimension.
- D. OSB: Oriented strand board
- E. 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

**1.03 SPECIAL CONDITIONS**

- A. The Contractor shall carefully review the Drawings for additional technical requirements and details related to the Work of this Section. Particular attention shall be paid to the structural characteristics of framing materials.
- B. The Contractor shall pay special attention to the selection and installation of lumber and related materials for rough carpentry to remain exposed after completion. The best of the materials available shall be reserved for this purpose.
- C. The Contractor shall be responsible for carefully examining existing framing to remain, verifying that it is structurally sound and suitable for continued use and notifying the Architect upon the discovery of any conditions which suggest that existing materials may be rotted, checked, warped, termite infested, improperly installed or otherwise unsuitable for continued use.
- D. Where the Drawings indicate that new construction shall match existing construction, it is generally intended that modern, standard dimension lumber be used and scabbed or shimmed as required to accommodate any dimensional differences. Existing lumber may only be reused following the approval of the Architect. In any event, the lumber used shall be structurally suitable for its intended use.
- E. Coordinate the location of framing, blocking, nailers, furring, grounds, and similar supports for finish materials, millwork, casework, finish carpentry, equipment, hardware and accessories so that the installation of finish work may be properly executed in compliance with the intended design requirements. Before starting installation of supports, carefully check all related shop drawings and submittals.

**1.04 ACTION SUBMITTALS**

- A. Lumber & Sheathing Schedule: Indicating lumber and sheathing sizes, species and grade, grading agency, moisture content and application location.
- B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details. MSDS sheets are not required to be submitted.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirement. Indicate type of preservative used and net amount of preservative retained.
  - 2. Include data for fire-retardant treatment from chemical 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, 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 waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.



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5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

**1.05 INFORMATIONAL SUBMITTALS**

- A. 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 or Review.
- B. Evaluation Reports: For the following, from ICC-ES:
  1. Wood-preservative-treated wood
  2. Fire-retardant-treated wood
  3. Power-driven fasteners
  4. Powder-actuated fasteners
  5. Expansion anchors
  6. Metal framing anchors

**1.06 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

**1.07 DELIVERY, STORAGE AND HANDLING**

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

**PART 2 – PRODUCTS**

**2.01 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 or Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  1. Factory mark each piece of lumber with grade stamp of grading agency
  2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
  3. 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.

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- B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal thickness or less, no limit for more than 2-inch nominal thickness unless otherwise indicated.
- C. Wood Structural Panels:
  - 1. Plywood: PS 1, PS2 or APA PRP-108

**2.02 WOOD-PRESERVATIVE-TREATED LUMBER**

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
  - 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 that 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, mark end or back of each piece or 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, stripping, and similar concealed members in contact with masonry or concrete.
  - 3. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
  - 4. Wood floor plates that are installed over concrete slabs-on-grade.

**2.03 FIRE-RETARDANT-TREATED MATERIALS**

- 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 Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame

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front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
  2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
  3. 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.
  4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Projects climatological zone.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates or treatment compliance issued by testing agency.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and required by authorities having jurisdiction.

**2.04 DIMENSION LUMBER FRAMING**

- A. Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 3 grade.
1. Application: Interior partitions not indicated as load-bearing.
  2. Species: Spruce-pine-fir; NLGA, NeLMA, WCLIB, or WWPA
- B. Load-Bearing Partitions: No. 1 grade.
1. Application: Exterior walls and interior load-bearing partitions.
  2. Species: Spruce-pine-fir; NLGA, WCLIB, or WWPA
- C. Ceiling Joists: No. 2 grade
1. Species: Spruce-pine-fir; NLGA, NeLMA, WCLIB, or WWPA
- D. Joists, Rafters, and Other Framing Not Listed Above: No.1 grade

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1. Species: Spruce-pine-fir; NLGA, NeLMA, WCLIB, or WWPA

**2.05 TIMBER FRAMING**

- A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:

1. Species and Grade: Hem-fir or hem-fir (north), No. 1 grade; NLGA, WCLIB, or WWPA.

**2.06 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, provide Standard, Stud, or No. 3 grade lumber and any of the following species:

1. Hem-fir (north); NLGA
2. Mixed southern pine; SPIB
3. Spruce-pine-fir; NLGA
4. Hem-fir; WCLIB or WWPA
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA
6. Western woods; WCLIB or WWPA
7. Northern species; NLGA
8. Eastern softwoods; NeLMA

- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine; No. 3 grade; SPIB
2. Hem-fir or hem-fir (north); Standard or No. 3 Common grade; NLGA, WCLIB, or WWPA
3. Spruce-pine-fir (south) or spruce-pine-fir; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA
4. Eastern softwoods; No. 3 Common grade; NeLMA
5. Northern species; No. 3 Common grade; NLGA
6. Western woods; Standard or No. 3 Common grade; WCLIB or WWPA

- D. 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 purpose.

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- E. 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.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

**2.07 SHEATHING**

- A. Softwood plywood shall conform to the requirements of the latest edition of U.S. Product Standard PS-1, Construction and Industrial.
- B. Plywood thicknesses shall be as scheduled below, unless specifically noted otherwise on the Drawings.
  - 1. Exterior Plywood Wall Sheathing: 1/2-inch; APA Rated, Exposure 1 sheathing
  - 2. Exterior Plywood Roof Sheathing @ Asphalt Shingles: 5/8-inch; APA Rated, Exposure 1 sheathing
  - 3. Floor Underlayment: APA Rated, Underlayment, Exposure 1 sheathing. Provide underlayment in thicknesses indicated or, if not indicated, not less than 1/4-inch over smooth subfloors and not less than 3/8-inch over board or uneven subfloors.
  - 4. Interior Wall Backing: 1/2-inch APA Rated, fire-retardant-treated sheathing.
  - 5. Miscellaneous Plywood (not specified elsewhere): Shall conform to the general applications and corresponding grades of softwood plywood as published in U.S. Product Standard PS-1 and shall be selected by means of its intended use, subject to Architect's approval.

**2.08 PLYWOOD BACKING PANELS**

- A. Equipment Backing Panels: DOC PS 1, Exterior, C-C Plugged Exposure 1, or C-D Plugged, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

**2.09 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 or Type 304 stainless steel.
- 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.

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- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers. All components to have a galvanized finish.

**2.10 METAL FRAMING ANCHORS**

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Cleveland Steel Specialty Co.
  2. Simpson Strong-Tie Co., Inc.
  3. USP Structural Connectors
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653 M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel TYPE B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
- D. Stainless-Steel Sheet: ASTM A 666, Type 304.
1. Use for exterior locations and where indicated.
- E. 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.
- F. Truss/Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
- G. Hold-Downs: Brackets for bolting to wall studs and securing foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base, size as shown on the drawings. Use manufacturer's recommended anchor size and connection hardware.

**2.11 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.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

**PART 3 – EXECUTION**

**3.01 INSTALLATION, GENERAL**

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- A. Set rough carpentry to required level 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, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. 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.
- H. 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. and to solidly fill space below partitions.
  - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- I. 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.
- J. 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
- K. 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
- L. Use hot dipped galvanized steel common 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. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- M. 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. Before fastening, mark fastener locations, using a template made of sheet metal, plastic or cardboard.
  2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
  3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

### **3.02 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION**

- A. Install where indicated and where required for screeding or 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.
- B. Attached items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. 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.

### **3.03 WALL AND PARTITION FRAMING INSTALLATION**

- A. General: Provide double bottom plates and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single bottom plate and top plate may be used for non-load-bearing partitions and a single top plate for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction unless otherwise indicated.



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1. For exterior walls, provide 2-by-6 inch nominal- size wood studs spaced 16 inches o.c. unless otherwise indicated.
  2. For interior partitions and walls, provide 2-by-6 inch nominal- or 2-by-4 inch nominal- size wood studs spaced 16 inches o.c. unless otherwise indicated.
  3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partition.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
  2. For load-bearing wall, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

**3.04 CEILING JOIST AND RAFTER FRAMING INSTALLATION**

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- size or 2-by-4-inch nominal- size stringers spaced 48 inches o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. When rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
  2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- size boards between every third pair of rafters, but not more than 28 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

**3.05 PLYWOOD INSTALLATION**

- A. Plywood materials shall be installed according to recommendations of the American Plywood Association.
- B. Plywood floor decking and underlayment shall be field glued and promptly screwed down tight. Glue shall comply with APA Specifications.
- C. Plywood roof sheathing shall be installed using manufacturer's standard galvanized "H" clips as recommended by the manufacturer.

**3.06 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.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry become sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

**END OF ROUGH CARPENTRY**

**SECTION 06 20 00**

**FINISH CARPENTRY**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Finish Carpentry as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
1. The Work shall include, but shall not necessarily be limited to:
- a. Exterior standing and running trim
  - b. Interior standing and running trim
  - c. PVC and foam plastic trim
  - d. Miscellaneous wood trim
- B. Related Work Specified Elsewhere:
- 1. SECTION 06 10 00: Rough Carpentry
  - 2. SECTION 07 46 23: Wood Siding
  - 3. SECTION 07 62 00: Sheet Metal Flashing and Trim
  - 4. SECTION 08 62 00: Unit Skylights
  - 5. SECTION 09 91 00: Painting
  - 6. SECTION 09 93 00: Staining and Transparent Finishing

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors 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 new amount of preservative retained. Include chemical treatment manufacturer's written instructions for finishing treated material.
  - 2. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
  - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
  - 4. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.
- B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- C. Samples for Verification:

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1. For each species and cut of lumber and panels products, with 1/2 of exposed surface finished; 50 sq. in. for lumber and 8 by 10 inches for panels.
2. For cellular PVC trim, with 1/2 of exposed surface finished; 50 sq. in.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Evaluation Reports: For the following, from ICC-ES:

1. Cellular PVC trim

**1.04 QUALITY ASSURANCE**

- A. Perform work in accordance with AWI AWS Section 6 grades identified in Section.
- B. Surface Burning Characteristics: Comply with the following when tested in accordance with NFPA 286.
1. During 40 kW Exposure: No flame spread to ceiling
  2. During 160 kW Exposure: No flame spread to perimeter of tested sample and no flashover.
  3. Total Smoke Release: Maximum 1,000 cu m
- C. Apply label from agency approved by authority having jurisdiction to identify each preservative treated and fire retardant treated material.
- D. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- E. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years' experience.
- F. Fabricator Qualifications: Company specializing in fabricating products specified in this section with minimum three years' experience. Shop is a certified participant in AWI's Quality Certification Program.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

**1.06 PROJECT CONDITIONS**

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- A. During and after installation of Work of this Section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.
  - 1. Maintain relative humidity ranges indicated in AWI AWS Section 2
- B. Weather Limitations for Exterior Work: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
- C. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or blotchy surface contamination and discoloration.

**1.07 WARRANTY**

- A. Manufacturer's Warranty for Cellular PVC Trim: Manufacturer agrees to repair and replace trim that fails due to defects in manufacturing within specified warranty period. Failures include, but are not limited to, deterioration, delamination, and excessive swelling from moisture.
  - 1. Warranty Period: 25 years from date of Substantial Completion

**PART 2 – PRODUCTS**

**2.01 MATERIALS, GENERAL**

- A. Environmental Quality Characteristics:
  - 1. Adhesives: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168; adhesives shall not contain urea formaldehyde
  - 2. Aerosol Adhesives: Maximum volatile organic compound content in accordance with GS-36
  - 3. Composite Wood Products: Contain no added urea-formaldehyde resins
- B. VOC Limits for Installation Adhesives: Installation adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, subpart D (EPA Method 24):
  - 1. Wood Glues: 30 g/L
  - 2. Multipurpose Construction Adhesives: 70 g/L
  - 3. Contact Adhesive: 250 g/L

**2.02 EXTERIOR MATERIALS**

- A. Exterior Softwood Lumber: Ponderosa pine.
  - 1. Cut: Plain sawn
  - 2. Finger Jointing: Not permitted

- B. Lumber Moisture Content Range: 9-15 percent

## **2.03 INTERIOR MATERIALS**

- A. Interior Softwood Lumber: Douglas Fir.

- 1. Cut: Plain sawn
  - 2. Finger Jointing: Not permitted

- B. Lumber Moisture Content Range: 9-15 percent

- C. Interior Plastic Boards and Panels: Extruded, expanded PVC with a small-cell microstructure, recommended by manufacturer for interior use, made from UV- and heat-stabilized, rigid material.

- 1. Density: Not less than 31 lb/cu. Ft.
  - 2. Heat Deflection Temperature: Not less than 130 deg F, according to ASTM D 648
  - 3. Coefficient of Thermal Expansion: Not more than  $4.5 \times 10^{-5}$  inches/inch x deg F
  - 4. Water Absorption: Not more than 1 percent, according to ASTM D 570
  - 5. Flame-Spread Index: 75 or less, according to ASTM E 84

## **2.04 WOOD TREATMENT**

- A. Fire Retardant Treatment: Chemically treated and pressure impregnated, having flame spread of 25 or less when tested in accordance with ASTM E 84 and showing no evidence of significant progressive combustion when test is continued for an additional 20 minute period.

- B. Wood Preservative: Pressure Treatment: WDMA I.S.4

- C. Provide identification on fire retardant treated material

- D. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

- E. Moisture Content after Treatment: Re-dried

- 1. Lumber: As specified for exterior and interior lumber
  - 2. Plywood: Maximum 15 percent

## **2.05 FABRICATION**

- A. Fabricate finish carpentry to AWI AWS Section 6 Custom Grade.

- B. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.

## **2.06 FINISHES**

- A. Sand work smooth and set exposed nails and screws.

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- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler matching surrounding surfaces and of types recommended for applied finishes.
- D. Stain, seal and varnish exposed to view surfaces.
- E. Seal internal surfaces and semi-concealed surfaces
- F. Seal surfaces in contact with cementitious materials.

**2.07 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
  - 2. Nails and Staples: ASTM F1667
- B. Concealed Joint Fasteners: Threaded steel.
- C. Wood Filler: Solvent or oil base, tinted to match surface finish color.
- D. Specialty plastic or PVC plugs to conceal countersunk screws in PVC trimwork.
- E. Adhesive for Cellular PVC Trim: Product recommended by trim manufacturer.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.
- C. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.02 PREPARATION**

- A. Clean substrates of projections and substances detrimental to application.
- B. Prime lumber and molding to be painted including both faces and edges, unless factory primed. Cut to required lengths and prime ends. Comply with requirements in Section 09 91 00 "Painting"

**3.03 DEMOLITION**

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- A. Modify and extend existing finish carpentry installations using materials and methods as specified.

**3.04 INSTALLATION**

- A. Install work in accordance with AWI AWS Section 6 and Custom Grade and manufacturer's instructions.
- B. Set and secure materials and components in place, plumb and level.
- C. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
  - 1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
  - 2. Coordinate exterior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.
- D. Carefully scribe work abutting other components, with maximum gaps of 1/32-inch. Do not use additional overlay trim to conceal larger gaps.
- E. Install cellular PVC trim to comply with manufacturer's written instructions.
  - 1. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24-inches long except where necessary.
    - a. Use scarf joints for end-to-end joints.
    - b. Stagger end joints in adjacent and related members.
    - c. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
    - d. All exterior fasteners are to be countersunk and plugged with specialty PVC plugs designed for this purpose.
- F. Standing and Running Trim: Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available to greatest extent possible. Do not use pieces less than 96-inches long except where necessary.
  - 1. Use scarf joints for end-to-end joints.
  - 2. Stagger end joints in adjacent and related members.
  - 3. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
  - 4. Install standing and running trim with no more variation from a straight line than 1/8-inch in 96-inches.
- G. Site Applied Wood Treatment:



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1. Brush apply one coat of preservative treatment on wood in contact with roofing and related metal flashings.
2. Treat site-sawn cuts. Apply preservative to site-sawn cuts in accordance with WDMA I.S.4.
3. Allow preservative to dry prior to erecting members.

H. Preparation for Site Finishing:

1. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
2. Site Finishing: Refer to Section 09 91 00 "Painting" and 09 93 00 "Staining and Transparent Finishing"

**3.05 TOLERANCES**

A. Conform to AWI AWS Section 6 requirements for the following:

1. Smoothness
2. Gaps
3. Flushness
4. Flatness

B. Maximum Variation from Indicated Position: 1/16-inch.

C. Maximum Offset from Alignment with Abutting Materials: 1/32-inch.

**3.06 SCHEDULES**

A. Exterior Finish Carpentry:

1. Bench Seats: Softwood; preservative treated; prepare for stain finish.
2. Soffits and Fascia's: Softwood; prepare for paint finish.
3. Window Casings and Moldings: Softwood; prepare for stain finish.
4. Trim: Softwood; prepare for paint finish.

B. Interior Finish Carpentry:

1. Trim: Softwood; prepare for transparent finish.
2. Wall Base: Cellular PVC
3. Decorative Planks: Softwood; Vee groove; prepare for transparent finish.

**END OF FINISH CARPENTRY**

**SECTION 06 61 16**

**SOLID SURFACING FABRICATIONS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Solid Surfacing Fabrications as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Countertops and sinks
    - b. Backsplashes, sideplashes and aprons
    - c. Wet wall cladding panels
    - d. Adhesives and Sealants
- B. Related Work Specified Elsewhere:
  - 1. SECTION 06 10 00: Rough Carpentry
  - 2. SECTION 22 00 00: Plumbing
  - 3. SECTION 26 00 00: Electrical

**1.02 DEFINITION**

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

**1.03 SUBMITTALS**

- A. Product Data:
  - 1. For each type of product indicated: Indicate product description, fabrication information and compliance with specified performance requirements.
  - 2. Product data for the following:
    - a. Mold resistance
- B. Shop Drawings: Submit shop drawings indicating location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
  - 1. Show full-size details, edge details, thermoforming requirements, attachments, etc.
  - 2. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement
  - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacles and other items installed in solid surface.
- C. Submit the following Samples:

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1. For each type of product specified.
  - a. Submit minimum 6-inch by 6-inch sample in specified gloss.
  - b. Cut sample and seam together for representation of inconspicuous seam.
  - c. Indicate full range of color and pattern variation.

**1.04 QUALITY ASSURANCE**

- A. Fabricators 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 three years and is certified in writing by the manufacturer.
- B. Installer Qualifications: Minimum of three years documented installation experience for projects similar in scope and complexity to the Project, and currently certified by the manufacturer as an acceptable installer.
- C. Applicable standards:
  1. Fire test response characteristics:
    - a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or other testing and inspecting agency acceptable to authorities having jurisdiction:
      - 1) Flame Spread Index: 25 or less
      - 2) Smoke Developed Index: 450 or less

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage to finished surfaces.
  1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

**1.06 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity and ventilation) within the limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Verify actual measurements and openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

**1.07 WARRANTY**

- A. Provide manufacturer's warranty against defects in materials.

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1. Warranty shall provide material and labor to repair or replace defective materials.
- B. Installed Warranty:
1. Fabrication and installation must be performed by a manufacturer's certified Fabrication/Installation source.
  2. This warranty shall cover all fabrication and installation performed by the certified/approved source subject to the specific wording contained in the Installed Warranty Card.
- C. Manufacturer's Warranty Period: Ten years from the date of substantial completion.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Subject to compliance with requirements, provide products by one of the following:
1. Corian Surfaces from DuPont Company (basis of design)
  2. Avonite Surfaces
  3. Wilsonart
  4. Formica Corporation
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 SOLID POLYMER COMPONENTS**

- A. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
- B. Superficial damage to a depth of 0.010 inch shall be repairable by sanding and/or polishing.
- C. Thickness:
1. Countertops: 1/2 inch
  2. Wall Cladding: 1/4 inch
- D. Edge treatment: As indicated on drawings

**2.03 INTEGRAL SINKS**

- A. Composition: Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
- B. Product Selections: As follows; specified dimensions as inside bowl dimensions:

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1. Model Number: 810 ADA-Compliant; 16-1/2 inches long by 13-1/8 inches wide by 5-3/8 inches deep.
2. Color: As selected by Owner from manufacturer's full range.
3. Mounting: Seamed undermount

**2.04 BACK AND SIDE SPLASHES**

- A. Backsplash: Applied.

**2.05 PERFORMANCE CHARACTERISTICS**

- A. Tensile Strength: 6,000 psi; ASTM D 638  
B. Tensile Modulus:  $1.5 \times 10^{-6}$  psi; ASTM D638  
C. Tensile Elongation: 0.4% minimum; ASTM D 638  
D. Flexural Strength: 10,000 psi; ASTM D 790  
E. Flexural Modulus:  $1.2 \times 10^{-6}$  psi; ASTM D 790  
F. Hardness: 56; Barcol Impressor, ASTM D 2583  
G. Thermal Expansion:  $1.80 \times 10^{-5}$  in./in. F; ASTM D 696  
H. Light Resistance: (Xenon Arc) No effect; NEMA LD 3-2000 Method 3.3  
I. Wear and Cleanability: Passes; ANSI Z124.3 & Z124.6  
J. Stain Resistance: Passes; ANSI Z124.3 & Z124.6  
K. Fungus and Bacteria Resistance: Does not support microbial growth; ASTM G21 & G22  
L. Boiling Water Resistance: No visible change; NEMA LD 3-2000 Method 3.5  
M. High Temperature Resistance: No change; NEMA LD 3-2000 Method 3.6  
N. Izod Impact: 0.26 ft.-lbs./in. of notch; ASTM D256 (Method A)  
O. Ball Impact Resistance: No fracture-1/2 lb. ball: 1/4 inch slab-36 inch drop, 1/2 inch slab-144 inch drop; NEMA LD 3-2000 Method 3.8  
P. Weatherability: Delta  $E^*_{94} < 5$  in 1,000 hrs.; ASTM G 155  
Q. Specific Gravity: 1.7  
R. Moisture Absorption: Less than 0.25 percent; ASTM D 570, long term  
S. Toxicity: 99 (solid colors), 66 (patterned colors); Pittsburgh Protocol Test ("LC50" Test)  
T. Flammability: Class I and Class A; ASTM E 84, NFPA 255 & UL 723  
U. Flame Spread Index: <25  
V. Smoke Developed Index: <25

**2.06 ACCESSORIES**

- A. Joint Adhesive: Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.
- B. Sealant: Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone – any type), UL-listed silicone sealant in colors matching components.
- C. Sink/Lavatory Mounting Hardware: Manufacturer's standard bowl clips, panel inserts and fasteners for attachment of undermount sinks/lavatories.

**2.07 FACTORY FABRICATION**

- A. Shop Assembly:

1. Fabricate components to the greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
  - a. Reinforce with strip of solid polymer material, 2 inches wide.
3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
4. Route and finish component edges with clean, sharp returns.
  - a. Route cutouts, radii and contours to template.
  - b. Smooth edges.
  - c. Repair or reject defective and inaccurate work.

## **2.08 FINISHES**

- A. Color: As selected by Architect from manufacturer's full color and price ranges.
- B. Finish: Provide surfaces with a uniform finish: Matte; gloss range of 5-20

## **PART 3 – EXECUTION**

### **3.01 EXAMINATION**

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

### **3.02 COUNTERTOP INSTALLATION**

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
  1. Provide product in the largest pieces available.
  2. Form field joints using manufacturer's recommended joint adhesive, with joints inconspicuous in finished work.
    - a. Exposed joints/seams shall not be allowed
  3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
  4. Cut and finish component edges with clean, sharp returns.
  5. Route radii and contours to template.
  6. Anchor securely to base cabinets or other supports.
  7. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
  8. Carefully dress joints smooth, remove surface scratches and clean entire surface.
  9. Install countertops with no more than 1/8-inch sag, bow or other variation from a straight line.

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- B. Applied Backsplashes: Install applied backsplashes using manufacturer's standard color-matched silicone sealant.
- C. Integral Sinks/Vanities:
  - 1. Provide solid surface materials bowls and/or lavatories sinks with overflows in locations shown on the drawings.
  - 2. Secure sinks and lavatory bowls to tops using manufacturer's recommended sealant, adhesive and mounting hardware to maintain warranty.

**3.03 WET WALL CLADDING PANELS INSTALLATION**

- A. Install wall cladding panels plumb, level, and true according to approved shop drawings and manufacturer's published installation instructions. Shim as required during installation process. Use woodworking and specialized fabrication tools acceptable to manufacturer.
- B. Route all wall cladding panels to size; sawcuts are not permissible. Cutouts must also be routed with eased edges.
- C. Provide eased panel edges where specified silicone sealant is required to fill gap between panels.
- D. Attach wall cladding panels to substrate with specified construction adhesive. Apply silicone adhesive as 1/8-inch beads in locations and spacing according to manufacturer's published installation instructions. Provide temporary bracing until adhesive has set to proper strength. Promptly remove excess adhesive.
- E. Form wall cladding joint seams for multiple panels with specified seam adhesive. Seam in locations shown on approved shop drawings and acceptable to manufacturer. Promptly remove excess adhesive. Joints shall be installed as follows:
  - 1. Panel to Panel Joints: Adhesive tongue and groove hard seam.
  - 2. Outside Corners: Silicone seam.
  - 3. Inside Corners: 2 1/2-inch baffle with silicone filled corner.
  - 4. Wall to Floor: As detailed on construction documents.
  - 5. Wall to Ceiling: Silicone filled.
- F. Provide specified silicone sealant to fill gaps in the following locations and as required by manufacturer:
  - 1. Wall panel joints indicated to receive silicone sealant.
  - 2. At inside corners.
  - 3. At interface with tub or shower pan.
  - 4. At interface with tiled shower base.
  - 5. Between finished floor and ceiling for full height cladding.
  - 6. Not greater than 12 feet on center for any wall cladding length or height.
- G. Wall-mounted accessories must be completely supported by substrate wall framing, not wall cladding panels.

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- H. Install solid surfacing moldings with specified silicone adhesive. Promptly remove excess adhesive.

**3.04 PROTECTION**

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

**END OF SOLID SURFACING FABRICATIONS**



**SECTION 06 64 00**

**PLASTIC PANELING**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Plastic Paneling as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Glass-fiber reinforced plastic (FRP) wall paneling
    - b. Accessories and trim
- B. Related Work Specified Elsewhere:
  - 1. SECTION 06 10 00: Rough Carpentry
  - 2. SECTION 06 20 00: Finish Carpentry
  - 3. SECTION 07 92 00: Joint Sealants

**1.02 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Submit shop drawings of each wall showing locations of paneling and trim members with respect to all discontinuities in the wall elevation.
- C. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.

**1.03 QUALITY ASSURANCE**

- 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.
  - 1. Flame-Spread Index: 200 or less.
  - 2. Smoke-Developed Index: 450 or less.
  - 3. Testing Agency: Acceptable to authorities having jurisdiction.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.

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- B. 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.

**1.05 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity and ventilation) within the limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

**1.06 WARRANTY**

- A. Furnish one year guarantee against defects in material and workmanship.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products by Marlite which is located at: 1 Marlite Drive, Dover, OH 44622, or comparable products by Fibertech, Fiberglass Specialties, Inc. or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 PLASTIC SHEET PANELING**

- A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.
  - 1. Basis of Design Product: Standard FRP
  - 2. Nominal Thickness: Not less than 2.3mm (0.090 inches).
  - 3. Surface Texture: As selected by Architect from manufacturer's full range.
  - 4. Color: As selected by Architect from manufacturer's full range.

**2.03 ACCESSORIES**

- A. Trim Accessories: Manufacturer's standard narrow one-piece extrusions designed to retain and cover edges of panels.
  - 1. Material: Vinyl.
  - 2. Color: As selected by Architect from manufacturer's full range.
  - 3. Trim Schedule:
    - a. Top Edges, Bottom Edges, & Vertical Edges: Marlite M370.
    - b. Inside Corners: Marlite M350.
    - c. Outside Corners: Marlite M360.
    - d. Vertical and Horizontal Joints: Sealant Joint.
- B. Exposed Fasteners: Not Permitted.
- C. Adhesive: As recommended by plastic paneling manufacturer.

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1. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Sealant: Single-component, mildew-resistant, neutral curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements of Section 07 92 00 "Joint Sealants."
- E. Base: Color and profile as selected by Architect from manufacturer's full range.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.02 PREPARATION**

- A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.
- B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- C. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
- D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- E. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.
  1. Mark plumb lines on substrate at panel joint locations for accurate installation.
  2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instruction.

**3.03 INSTALLATION**

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive. Drive rivets and exposed fasteners are not permitted.
- C. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

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- D. Fill grooves in trim accessories with sealant before installing and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.
- G. Remove excess sealant and smears as paneling is installed. Clean with a solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

**END OF PLASTIC PANELING**

**SECTION 07 25 00**

**WEATHER BARRIERS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Weather Barriers as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Weather barrier membranes
    - b. Seam tape
    - c. Flexible flashing
    - d. Fasteners
- B. Related Work Specified Elsewhere:
  - 1. SECTION 06 10 00: Rough Carpentry
  - 2. SECTION 07 46 23: Wood Siding

**1.02 ACTION SUBMITTALS**

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used, including:
  - 1. Preparation instructions and recommendations
  - 2. Storage and handling requirements and recommendations
  - 3. Installation methods
  - 4. Design data and test reports

**1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store weather barrier materials as recommended by weather barrier manufacturer.

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**1.05 SCHEDULING**

- A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.
- B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

**1.06 WARRANTY**

- A. Provide manufacturer's warranties:
  - 1. Weather barrier manufacturer's warranty for weather barrier for a period of ten (10) years from date of substantial completion.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products from DuPont which is located at: Chestnut Run Plaza 728, Wilmington, DE 19805, or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 WEATHER BARRIER**

- A. Basis of Design: Spunbonded polyolefin, non-woven, non-perforated. Weather Barrier is based upon DuPont Tyvek CommercialWrap and related assembly components.
- B. Performance Characteristics:
  - 1. Air Penetration: 0.001 cfm/sf at 75 Pa when tested in accordance with ASTM E 2178. Type 1 when tested in accordance with ASTM E 1677.  $\leq 0.04$  cfm/ft @ 75 Pa when tested in accordance with ASTM E 2357.
  - 2. Water Vapor Transmission: 30 perms, when tested in accordance with ASTM E 96, Method B.
  - 3. Water Penetration Resistance: 235 cm when tested in accordance with AATCC Test Method 127
  - 4. Basis Weight: 2.4 oz. /square yard, when tested in accordance with TAPPI Test Method T-410.
  - 5. Air Infiltration Resistance: Air infiltration at >750 seconds, when tested in accordance with TAPPI Test Method T-460
  - 6. Tensile Strength: 33/41 lbs./in., when tested in accordance with ASTM D 822, Method A
  - 7. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84. Flame Spread: 15, Smoke Developed: 25

**2.03 ACCESSORIES**

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- A. Seam Tape: Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in weather barrier.
- B. Fasteners: Weather Barrier manufacturer's Caps; #4 nails with large 1 inch plastic cap fasteners or 1 inch minimum plastic cap staple with leg length sufficient to achieve a minimum penetration of 5/8 inch into the wood stud.
- C. Sealants: Provide sealants that comply with ASTM C 920, elastomeric polymer sealant to maintain watertight conditions, as recommended by weather barrier manufacturer.
- D. Adhesives: Provide adhesive recommended by weather barrier manufacturer as required for project conditions
- E. Primers: Provide flashing manufacturer's recommended primer to assist in adhesion between substrate and flashing.
- F. Flexible Flashing:
  - 1. Flexible membrane flashing materials for window openings and penetrations as manufactured by weather barrier manufacturer.
  - 2. Straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc. as manufactured by weather barrier manufacturer.
  - 3. Dual-sided flashing membrane materials for brick mold and non-flanged windows and doors as manufactured by weather barrier manufacturer.
  - 4. Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials.
  - 5. Preformed three-dimensional shapes to complete the flashing system used in conjunction with Thru-Wall flashing.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

- A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer's recommended tolerances prior to installation of weather barrier and accessories.

**3.02 INSTALLATION**

- A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations
- B. Install weather barrier prior to installation of windows and doors.
- C. Start weather barrier installation at a building corner, leaving 6 to 12 inches of weather barrier extended beyond corner to overlap.

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- D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level
- E. Window and Door Openings: Extend weather barrier completely over openings.
- F. Overlap weather barrier.
  - 1. Exterior corners: minimum 12-inches
  - 2. Seams: minimum 6-inches
- G. Weather Barrier Attachment: Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommended fasteners, space 6 to 18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

**3.03 SEAMING**

- A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- B. Seal any tears or cuts as recommended by weather barrier manufacturer.

**3.04 OPENING PREPARATION**

- A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.
- B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

**3.05 FLASHING**

- A. Cut 9 inch wide Flexible Flashing a minimum of 12 inches longer than width of sill rough opening.
- B. Cover horizontal sill by aligning Flexible Flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
- C. Fan Flexible Flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
- D. Apply 9-inch wide strips of straight flashing at jambs. Align flashing with interior edge of jamb framing. Start straight flashing at head of opening and lap sill flashing down to the sill.
- E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.
- F. Install flexible flashing at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.
- G. Coordinate flashing with window installation.



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- H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.
- I. Position weather barrier head flap across head flashing. Adhere using 4-inch wide straight flashing over the 45-degree seams.
- J. Tape top of window in accordance with manufacturer recommendations.
- K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

**3.06 PROTECTION**

- A. Protect installed weather barrier from damage.

**END OF WEATHER BARRIERS**

**SECTION 07 31 13**

**ASPHALT SHINGLES**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Asphalt Shingles as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Asphalt Shingles
    - b. Underlayment
- B. Related Work Specified Elsewhere:
  - 1. SECTION 06 10 00: Rough Carpentry
  - 2. SECTION 07 62 00: Sheet Metal Flashing and Trim
  - 3. SECTION 08 62 00: Unit Skylights

**1.02 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.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
  - 1. Include similar Samples of trim and accessories involving color selection.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified Installer
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.
- C. Research/Evaluation Reports: For each type of asphalt shingle required, from the ICC.
- D. Warranties: Sample of special warranties
- E. Maintenance Data: For each type of asphalt shingle to include in maintenance manuals.

**1.05 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Asphalt Shingles: 100 square feet of each type, in unbroken bundles.

#### **1.06 QUALITY ASSURANCE**

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

#### **1.07 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
  - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- C. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

#### **1.08 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not deliver or install asphalt shingles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
  - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

#### **1.09 WARRANTY**

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following
    - a. Manufacturing defects.
    - b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
  - 2. Material Warranty Period: 50 years from date of Substantial Completion, prorated, with first 12 years non-prorated.
  - 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 110 mph for 10 years from date of Substantial Completion.

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4. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor 10 years from date of Substantial Completion.
  5. Workmanship Warranty Period: 10 years from date of Substantial Completions
- B. Special Project Warranty: Roofing Installer's Warranty, or warranty form at end of this Section, signed by roofing installer, covering the Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials, workmanship or weathertightness, within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products manufactured by CertainTeed Corporation which is located at: P.O. Box 860, Valley Forge, PA 19482, or comparable products by GAF Materials Corporation, Owens Corning or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 GLASS-FIBER-REINFORCED ASPHALT SHINGLES**

- A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced and self-sealing.
1. Basis of Design Product: Subject to compliance with requirements, provide CertainTeed Landmark Premium.
  2. Butt Edge: Notched cut
  3. Strip Size: Manufacturer's standard
  4. Algae Resistance: Granules treated to resist algae discoloration
  5. Color and Blends: As selected by Architect from manufacturer's full range
- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles or site-fabricated units cut from asphalt shingle strips. Trim each side of lapped portion of unit to taper approximately 1-inch.

**2.03 UNDERLAYMENT MATERIALS**

- A. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 40-mil-thick, slip resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied.
1. Basis of Design Product: Subject to compliance with requirements, provide Grace, W.R. & Co., Ice-and-Water Shield or comparable product by one of the following:
    - a. Carlisle Coatings & Waterproofing, Inc.
    - b. Henry Company
    - c. Johns Manville

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- d. Owens Corning
- e. Polyguard Products, Inc.
- f. Protecto Wrap Company

B. Felt: ASTM D 226/D 226 M, asphalt saturated organic felts, non-perforated.

**2.04 ACCESSORIES**

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch diameter flat head and of sufficient length to penetrate 3/4-inch into solid wood decking or extend at least 1/8-inch through OSB or plywood sheathing.

- 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.

**2.05 METAL FLASHING AND TRIM**

A. General:

- 1. Sheet Metal: Anodized aluminum

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.

- 1. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof-deck flange and 1-1/2 inch fascia flange with 3/8-inch drip at lower edge.

C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16-inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4-inches from pipe onto roof.

**PART 3 – EXECUTION**

**3.01 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.

- 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.

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2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.02 UNDERLAYMENT INSTALLATION**

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2-inches over underlying course. Lap ends a minimum of 4-inches. Stagger end laps between succeeding courses at least 72-inches. Fasten with felt-underlayment nails.
  1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3-inches in direction that sheds water. Lap ends of felt not less than 6-inches over self-adhering sheet underlayment.
  2. Install fasteners at no more than 36-inches on center.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24-inches between courses. Roll laps with roller. Cover underlayment within seven days.

**3.03 METAL FLASHING INSTALLATION**

- A. General: Install metal flashings according to ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck
- C. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- D. Pipe Flashings: Form flashings around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

**3.04 ASPHALT SHINGLE INSTALLATION**

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

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- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed with self-sealing strip face up at roof edge.
  - 1. Extend asphalt shingles 1/2-inch over fascia at eaves and rakes.
  - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Fasten asphalt shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.
  - 1. When ambient temperature during installation is below 50 degrees F, seal asphalt shingles with asphalt roofing cement spots.
- E. Woven Valleys: Extend succeeding asphalt-shingle courses from both sides of valley 12-inches beyond center of valley, weaving intersecting shingle-strip courses over each other. Use one-piece shingle strips without joints in valley.
  - 1. Do not nail asphalt shingles within 6-inches of valley center.
- F. Ridge Shingle: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
  - 1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow

**3.05 ROOFING INSTALLER'S WARRANTY**

- A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following Project:
  - 1. Owner: <Insert name of Owner>
  - 2. Address: <Insert address>
  - 3. Building Name/Type: <Insert information>
  - 4. Address: <Insert address>
  - 5. Area of Work: <Insert information>
  - 6. Acceptance Date: <Insert date>
  - 7. Warranty Period: <Insert date>
  - 8. Expiration Date: <Insert date>
- B. AND WHEREAS Roofing Installer 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.
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he shall, at his own cost and expense, make or cause to be

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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 a weathertight condition.

D. 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;
  - b. Peak gust wind speed exceeding 110 mph;
  - c. Fire;
  - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
  - e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
  - f. Vapor condensation on bottom of roofing; and
  - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty and is liable for consequential damages to building or building contents resulting from leaks or faults or defects of roofing work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, 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 on date of such alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified the Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. 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 on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.



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E. IN WITNESS THEREOF, this instrument has been duly executed the **<Insert day>** day of **<Insert month>**, **<Insert year>**.

1. Authorized Signature: **<Insert signature>**
2. Name: **<Insert name>**
3. Title: **<Insert title>**

**END OF ASPHALT SHINGLES**

**SECTION 07 46 23**

**WOOD SIDING**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Wood Siding as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Wood panel siding
- B. Related Work Specified Elsewhere:
  - 1. SECTION 06 10 00: Rough Carpentry
  - 2. SECTION 06 20 00: Finish Carpentry
  - 3. SECTION 07 25 00: Weather Barriers
  - 4. SECTION 09 91 00: Painting
  - 5. SECTION 09 93 00: Staining and Transparent Finishing

**1.02 SUBMITTALS**

- A. Product Data: For each type of product specified.
- B. Submit the following Samples:
  - 1. For each exposed product and for each color and finish specified, in sizes indicated

**1.03 QUALITY ASSURANCE**

- A. Manufacturers Qualifications: Minimum 5 years' experience harvesting and milling forest products.
- B. Installer Qualifications: Minimum 2 years' experience installing similar products.
- C. Grading Agency Qualifications: An independent testing and inspecting agency recognized by authorities having jurisdiction as qualified to label siding for compliance with referenced grading rules.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Store siding in a dry, well-ventilated, weathertight location according to manufacturer's written instructions.

**1.05 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit siding installation and related work to be performed according to manufacturer's written instructions.
1. Field-Finished Siding: Proceed with installation of siding only when existing and forecast weather conditions permit installation and the immediate application of at least one coat of specified finish on siding before it is exposed to rain, snow, or dampness.
    - a. Proceed with installation only after base or primer coat has been applied to every surface of siding units and has dried.

**1.06 WARRANTY**

- A. Special Materials Warranty: Manufacturer's warranty in which manufacturer agrees to repair or replace products that fail in materials within specified warranty period. Material failures include manufacturing defects that result in leaks.
1. Materials Warranty Period: Limited lifetime from date of Substantial Completion

**PART 2 – PRODUCTS**

**2.01 BOARD AND BATTEN SIDING**

- A. General: Patterned wood siding
1. Species: Spruce-Pine-Fir
  2. Board Size: 1x10
  3. Batten Size: 1x3
  4. Grade: A Clear
  5. Finish: Plain Sawn, S4S
  6. Moisture: Kiln-dried to approximately 12%
  7. Edge: Square butt
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 ACCESSORIES**

- A. Flashing: Provide factory painted aluminum flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.
1. Finish for Aluminum Flashing: High-performance organic finish (Kynar pvf paint system), same color as siding Factory coating as approved by Owner.
- B. Fasteners:
1. For fastening wood, use stainless steel siding nails of sufficient length to penetrate a minimum of 1-inch into substrate.

2. For fastening aluminum flashings, use stainless steel or aluminum fasteners.

### **2.03 RAINSCREEN**

- A. Basis of Design: Products manufactured by Benjamin Obdyke Incorporated, which is located at: 400 Babylon Road, Suite A, Horsham, PA 19044, or approved equal.
  1. Basis of Design Product: Slicker Classic
    - a. Description: Vertically-channeled three-dimensional matrix in roll form.
    - b. Material: Nylon (up to 10% post-industrial recycled content).
    - c. Thickness: 0.25-inches
    - d. Matrix Design: 8 channels per 4-inches. Two channels per inch.

## **PART 3 – EXECUTION**

### **3.01 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. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION, GENERAL**

- A. Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Do not install damaged components.

### **3.03 RAINSCREEN INSTALLATION**

- A. Install sidewall sheathing material over framing.
- B. Apply weather barrier in accordance with Section 07 25 00 "Weather Barriers."
- C. Apply trim around windows and doors or shim out other trim 1/4-inch to allow for thickness of rainscreen.
- D. Install rainscreen by butting against window and door trim.
  1. Wherever siding or cladding will be applied, roll out rainscreen with channels running vertically. Cover entire wall surface wherever siding materials will be installed.
  2. Do not stretch rainscreen.
  3. Install rainscreen so that it lies flat against the wall.
  4. Butt edges of new rolls or new courses together. Do not overlap layers of rainscreen.
  5. Nail or staple rainscreen every 3 square feet.
- E. Install siding or cladding system over wall surface in compliance with manufacturer's installation instructions.

1. Install siding even with trim.
- F. To prevent insect infiltration along bottom edge of siding, attach a 6-inch wide piece of screen material (1/8-inch maximum hole size) continuously along the wall, 3-inches above bottom edge of rainscreen. Fold up onto outer surface of installed rainscreen and fasten with a large head nail to hold in place prior to applying siding or cladding.

### **3.04 WOOD BOARD AND BATTEN SIDING INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Products shall have all butt and scarf joints sealed with a quality, exterior rated, flexible sealant prior to paint application. All non-trim/fascia abutments shall be sealed with the same exterior grade sealant.
- C. Ends exposed due to post-manufacturing field cuts shall be sealed with a premium, 100% acrylic primer, to ensure that no fiber is left to the elements.
- D. Use only corrosion resistant fasteners. Acceptable are stainless steel or hot-dipped galvanized nails; minimum size – 7 penny.
- E. Joints shall fall over framing lumber and shall be double nailed. Trim boards of 10 inches or greater in width require 3 nails evenly spaced across the face of the board. Do not nail any less than 1/2-inch from any edge and fasten a minimum of 24-inches on center.
- F. Drive nails perpendicular to the framing lumber and the wood trim product; drive nails flush with the products surface. Nails shall penetrate at least 1-1/4 inches into the structural framing.

### **3.05 ADJUSTING AND CLEANING**

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

**END OF WOOD SIDING**

**SECTION 07 92 00**

**JOINT SEALANTS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Joint Sealants as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Silicone joint sealants.
    - b. Urethane joint sealants.
    - c. Latex joint sealants.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each joint-sealant product specified, including: Preparation instructions and recommendations
- B. Samples for Initial Selection: Manufacturer's color charts consisting of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind 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 joints sealants.
- D. Joint Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation
  - 4. Joint-sealant color.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified Installer and testing agency.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

**1.04 QUALITY ASSURANCE**

- A. Source Limitations: Obtain each kind of joint sealant from a single source from single manufacturer.

- B. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
  - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- C. Installer Qualifications: Experienced Installer equipped and trained for application of joint sealants required for this Project with record of successful completion of projects of similar scope.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.

**1.06 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity and ventilation) within the limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. 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 degrees F.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

**1.07 WARRANTY**

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: 7 to 10 years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
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**

### **2.01 MANUFACTURERS**

- A. Basis of Design: Provide joint sealant products manufactured by Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company which is located in: Beachwood, OH, or comparable products by Dow Corning Corporation, Sika Corporation, Pecora Corporation, or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

### **2.02 MATERIALS, GENERAL**

- A. VOC Content for Interior Applications: Provide sealants and sealant primers complying with the following VOC content limits per 40 CFR 59, Subpart D (EPA Method 24):
  1. Architectural Sealants: 250 g/L.
  2. Sealant Primers for Nonporous Substrates: 250 g/L.
  3. Sealant Primers for Porous Substrates: 775 g/L.
- B. Compatibility: Provide joint sealants and accessory materials that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer using ASTM C 1087 testing and related experience.
- C. Joint Sealant Standard: Comply with ASTM C 920 and other specified requirements for each sealant.
- D. Stain Test Characteristics: Where sealants are required to be non-staining, provide sealants tested per ASTM C 1248 as non-staining on porous joint substrates specified.

### **2.03 SILICONE JOINT SEALANTS**

- A. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant **SJS #1**: ASTM C 920, Type S, Grade NS, Class 100/50, Use NT; SWRI validated.
  1. Basis of Design Product: Spectrem 1 by Tremco
  2. Volatile Organic Compound Content: 1 g/L maximum
  3. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
  4. Color: As selected by Architect from manufacturer's standard line of colors.



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- B. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant **SJS #2**: ASTM C 920, Type S, Grade NS, Class 50, Use NT; SWRI validated.
1. Basis of Design Product: Spectrem 2 by Tremco
  2. Volatile Organic Compound Content: 50 g/L maximum
  3. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
  4. Color: As selected by Architect from manufacturer's standard line of colors.
- C. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant **SJS #3**: ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Basis of Design Product: Tremsil 200 Sanitary by Tremco
  2. Volatile Organic Compound Content: 1 g/L maximum
  3. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
  4. Color: As selected by Architect from manufacturer's standard line of colors.

**2.04 URETHANE JOINT SEALANTS**

- A. Single-Component, Nonsag, Moisture-Cure, Polyurethane Joint Sealant **UJS #1**: ASTM C 920, Type S, Grade NS, Class 50, Use NT.
1. Basis of Design Product: Dymonic 100 by Tremco
  2. Volatile Organic Compound (VOC) Content: 40 g/L maximum.
  3. Tensile Strength ASTM D412: 350 to 450 psi.
  4. Percent Elongation ASTM D412: 800 to 900%.
  5. Modulus at 100% ASTM D412: 75 to 85 psi.
  6. Tear Strength ASTM D412: 65 to 75 psi.
  7. Smoke Development ASTM E84: 5
  8. Color: As selected by Architect from manufacturer's standard line of colors.
- B. Immersible, Multi-Component, Pourable, Traffic Grade Polyurethane Joint Sealant **UJS #2**: ASTM C 920, Type M, Grade P, Class 35, Use T, O and I.
1. Basis of Design Product: Vulkem 445SSL by Tremco.
  2. Tensile Strength ASTM D412: 250 psi, at 100 percent elongation.
  3. Tear Strength ASTM D412: 35 pli.
  4. Adhesion to Concrete, After Water, ASTM C 794: 28 pli.
  5. Hardness, ASTM C 661: 40 durometer Shore A, minimum.
  6. Accelerated Weathering, ASTM C 793: Pass.
  7. Volatile Organic Compound (VOC) Content: 106 g/L maximum.
  8. Color: As selected by Architect from manufacturer's standard line of colors.

**2.05 LATEX JOINT SEALANTS**

- A. Latex Joint Sealant **LJS #1**: Siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Basis of Design Product: Tremflex 834 by Tremco
  2. Volatile Organic Compound (VOC) Content: 35 g/L maximum.
  3. Color: As selected by Architect from manufacturer's standard line of colors.

**2.06 SOLVENT-RELEASE-CURING JOINT SEALANTS**

- A. Butyl-Rubber-Based Joint Sealant **BJS #1**: ASTM C 1311.
1. Basis of Design Product: Tremco Butyl Sealant
  2. Volatile Organic Compound (VOC) Content: 250 g/L maximum.
  3. Color: As selected by Architect from manufacturer's standard line of colors.

**2.07 JOINT SEALANT ACCESSORIES**

- A. Cylindrical Sealant Backing: ASTM C 1330, Type B non-absorbent, bi-cellular material with surface skin, or Type O open-cell polyurethane, as recommended by sealant manufacturer for application.
- B. Bond Breaker Tape: Polymer tape compatible with joint sealant and adjacent materials and recommended by sealant manufacturer.
- C. Joint Substrate Primers: Substrate primer recommended by sealant manufacturer for application.
- D. Cleaners: Chemical cleaners acceptable to joint sealant manufacturer.
- E. Masking Tape: Non-Staining, non-absorbent tape product compatible with joint sealants and adjacent surfaces.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

- A. Examine joint profiles and surfaces to determine if work is ready to receive joint sealants. Verify joint dimensions are adequate for development of sealant movement capability. Verify joint surfaces are clean, dry, and adequately cured. Proceed with joint sealant work once conditions meet sealant manufacturer's written recommendations.

**3.02 PREPARATION**

- A. Joint Surface Cleaning: Clean joints prior to installing joint sealants using materials and methods recommended by sealant manufacturer. Comply with ASTM C 1193.
1. Remove curing compounds, laitance, form-release agents, dust, and other contaminants.
  2. Clean nonporous and porous surfaces utilizing chemical cleaners acceptable to sealant manufacturer.
  3. Protect elements surrounding the Work of this section from damage or disfiguration. Apply masking tape to adjacent surfaces when required to prevent damage to finishes from sealant installation.

**3.03 SEALANT APPLICATION**

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- A. Sealant and Primer Installation Standard: Comply with ASTM C 1193 and manufacturer's written instructions.
- B. Joint Backing: Select joint backing materials recommended by sealant manufacturer as compatible with sealant and adjacent materials. Install backing material at depth required to produce profile of joint sealant allowing optimal sealant movement.
  - 1. Install joint backing to maintain the following joint ratios:
    - a. Joints up to 1/2-inch wide: 1:1 width to depth ratio.
    - b. Joints greater than 1/2-inch wide: 2:1 width to depth ratio; maximum 1/2-inch joint depth.
  - 2. Install bond breaker tape over substrates when sealant backings are not used.
- C. Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.
- D. Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.
- E. Liquid Sealant Application: Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.
  - 1. Tool sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.
  - 2. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
  - 3. Tool exposed joint surface concave using tooling agents provided by sealant manufacturer for application.
- F. Cleaning: Remove excess sealant using materials and methods approved by sealant manufacturer that will not damage joint substrate materials.
  - 1. Remove masking tape immediately after tooling joint without disturbing seal.
  - 2. Remove excess sealant from surfaces while still uncured.
- G. Installation of Acoustical Sealant: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations on both sides of assemblies with a continuous bead of acoustical sealant. Comply with ASTM C 919 and with manufacturer's written recommendations.
- H. Installation of Preformed Seals: Install seals immediately after removing protective wrapping. Do not stretch or misshape material. Place seals to provide continuity at ends, turns, and intersections. Apply heat to sealant when recommended by sealant manufacturer's written instructions.

**3.04 FIELD QUALITY CONTROL**

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- A. Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C 1193, Method A.
  - 1. Perform 5 tests for the first 1000-feet of joint length for each kind of sealant and joint substrate, and one test for each 1000-feet of joint length thereafter or 1 test per each floor per building elevation, minimum.
  - 2. For sealant applied between dissimilar materials, test both sides of joint.
- B. Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.
- C. Submit report of field adhesion testing to Owner indicating tests, locations, dates, results, and remedial actions taken.

**3.05 EXTERIOR JOINT-SEALANT SCHEDULE**

- A. Exterior concealed transition joints in air barrier: **UJS #1**
- B. Exterior movement joints in stone masonry: **SJS #2**
- C. Exterior concealed watertight joints in cladding system: **SJS #1**
- D. Exterior joints between different materials listed above: **SJS #1**
- E. Exterior perimeter joints at frames of doors, windows, storefront frames, curtain wall frames, and louvers: **SJS #1**
- F. All other exterior non-traffic joints: **SJS #1**
- G. Exterior horizontal traffic and traffic isolation joints: **UJS #2**

**3.06 INTERIOR JOINT-SEALANT SCHEDULE**

- A. Interior perimeter joints of interior frames: **LJS #1**
- B. Interior sanitary joints between plumbing fixtures, food preparation fixtures, and casework and adjacent walls, floors and counters: **SJS #3**
- C. Interior non-moving joints between interior painted surfaces and adjacent materials: **LJS #1**
- D. Interior concealed sealants at thresholds and sills: **BJS #1**

**END OF JOINT SEALANTS**

**SECTION 08 16 00**

**COMPOSITE DOORS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Composite Doors as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. FRP doors
    - b. Fiberglass doors
    - c. Fiberglass door frames
- B. Related Work Specified Elsewhere:
  - 1. SECTION 08 71 00: Door Hardware

**1.02 ACTION SUBMITTALS**

- A. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.
- B. Shop Drawings: Submit shop drawings indicating elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.
- C. Submit the following 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.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Test Reports: Submit test reports from qualified independent testing agency indicating doors comply with performance requirements.
- B. 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.
- C. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.
- D. Warranty: Submit manufacturer's standard warranty.

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**1.04 QUALITY ASSURANCE**

A. Manufacturers Qualifications:

1. Continuously engaged in manufacturing 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.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.
- C. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- D. Protect materials and finish from damage during handling and installation.

**1.06 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity and ventilation) within the limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

**1.07 WARRANTY**

- A. Warranty 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. In addition, a limited lifetime (while the door is in its specified application in its original installation) warranty covering: failure of corner joinery, core deterioration, delamination or bubbling of door skin.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Special-Lite, Inc. which is located at: P.O. Box 6, Decatur, MI 49045, or comparable products by CORRIM Company or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 FRP DOORS**

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- A. Basis of Design Product: SL-17 Flush Doors with SpecLite 3 fiberglass reinforced polyester (FRP) face sheets.
- B. Door Opening Size: As indicated on the Drawings.
- C. Construction:
  - 1. Door Thickness: 1 3/4-inches.
  - 2. Stiles and Rails: Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T6 alloy recovered from industrial processes, minimum of 2-5/16 inch depth.
  - 3. Corners: Mitered.
  - 4. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom integral to standard tubular shaped stiles and rails reinforced to accept hardware as specified.
  - 5. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery. Welds, glue, or other methods are not acceptable.
  - 6. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
  - 7. Rail caps or other face sheet capture methods are not acceptable.
  - 8. Extrude top and bottom rail legs for interlocking continuous weather bar.
  - 9. Meeting Stiles: Pile brush weatherseals. Extrude meeting stile to include integral pocket to accept pile brush weatherseals.
  - 10. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded interlocking edge of bottom rail.
  - 11. Glue: Use of glue to bond sheet to core or extrusions is not acceptable.
- D. Face Sheet:
  - 1. Material: SpecLite3 FRP, 0.120-inch thickness, finish color throughout.
  - 2. Protective coating: Abuse-resistant engineered surface. Provide FRP with SpecLite3 protective coating, or equal.
  - 3. Texture: Pebble.
  - 4. Color: As selected by Architect from manufacturer's full range.
  - 5. Adhesion: The use of glue to bond face sheet to foam core is prohibited.
- E. Core:
  - 1. Material: Poured-in-place polyurethane foam.
  - 2. Density: Minimum 5 pounds per cubic foot.
  - 3. R-Value: Minimum of 9.
  - 4. ASTM E84: Class A.
- F. Cutouts:
  - 1. Manufacture doors with cutouts for required vision lites, louvers, and panels.
  - 2. Factory install vision lites, louvers, and panels.
- G. Hardware:

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1. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
2. Factory install hardware.

**2.03 FIBERGLASS DOORS**

- A. Basis of Design Product: AF-100 Pultruded FRP Door.
- B. Door Opening Size: As indicated on the Drawings.
- C. Construction:
1. Door Thickness: 1 3/4-inches.
  2. Construction: Doors shall be FRP, pultruded as one monolithic panel, with integral stiles.
  3. Reinforcement: Solid FRP shapes to be chemically welded at factory. All structural members shall utilize a chemically resistant UV stabilized resin system.
  4. Stile Edge: Seamless 9/16" thick solid FRP.
  5. Top Rail: 6" pultruded tube profile designed to fit flush and be chemically welded inside the door.
  6. Bottom Rail: Pultruded FRP inverted U channel designed to fit flush and be chemically welded inside the door, allowing doors to be field trimmed. Closed bottom rail to be supplied as option.
- D. Face Sheet:
1. Material: Pultruded FRP, 0.125-inch thickness, finish color throughout.
  2. Texture: Smooth
  3. Fiberglass Content: Minimum 47% by weight.
  4. Color: As selected by Architect from manufacturer's full range.
- E. Core:
1. Material: Polyurethane foam.
  2. Density: Minimum 6 pounds per cubic foot.
  3. ASTM E84: Class B.
- F. Cutouts:
1. Manufacture doors with cutouts for required vision lites, louvers, and panels.
  2. Factory install vision lites, louvers, and panels.
- G. Hardware:
1. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.

**2.04 MATERIALS**



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A. Aluminum Members:

1. Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T6 alloy recovered from industrial processes: 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.

B. Components: Door and frame components from same manufacturer.

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.

**2.05 FABRICATION**

A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on 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.

**2.06 FIBERGLASS FRAMES**

A. Framing:

1. Size and Type: As indicated on the Drawings.
2. Materials: 1/4" thick solid pultruded FRP profiles having no corrosive components or reinforcement.
3. Width: 2" face.
4. Depth: As required by wall construction.
5. Assembly: Knock down (KD) for field assembly.
6. Door Stop: 5/8" x 2 1/4".

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7. Corner Construction: Mitered with 4" x 4" x 3/8" pultruded FRP angle reinforcement with interlocking pultruded FRP brackets.
8. Reinforcing: 1/4" pultruded FRP chemically welded at all hinge, strike and closer locations.
9. Anchors: As suitable for types of construction.
10. Fasteners for Reinforcing: 18-8 Stainless Steel.

**2.07 HARDWARE**

- A. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
- B. Hardware Schedule: As specified in Section 08 71 00 "Door Hardware."

**PART 3 – EXECUTION**

**3.01 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.

**3.02 PREPARATION**

- A. Ensure openings to receive frames are plumb, level, square, and in tolerance.

**3.03 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.

**3.04 ADJUSTING**

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- A. Adjust doors, hinges, and locksets for smooth operation without binding.

**3.05 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.

**3.06 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 COMPOSITE DOORS**

**SECTION 08 62 00**

**UNIT SKYLIGHTS**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Unit Skylights as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Self-flashing unit skylights with integral curbs
    - b. Tubular daylighting systems
    - c. Flashing kits
- B. Related Work Specified Elsewhere:
  - 1. SECTION 06 10 00: Rough Carpentry
  - 2. SECTION 07 31 13: Asphalt Shingles

**1.02 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's data sheets on each product to be used:
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for unit skylights.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.
  - 2. Manual Operators: Show locations, mounting, and details for installing operator components and controls.
- C. Submit the following Samples:
  - 1. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- B. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic cleaning and maintenance of all components.

**1.04 QUALITY ASSURANCE**

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- A. Manufacturers Qualifications: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in installing products similar to those specified in this Section with minimum five years documented experience.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Deliver products in manufacturer's original containers dry, undamaged, with seals and labels intact.
- C. Store products in manufacturer's unopened packaging until ready for installation.

**1.06 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity and ventilation) within the limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

**1.07 WARRANTY**

- A. Special Warranty: Manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Uncontrolled water leakage.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - c. Yellowing of acrylic glazing.
    - d. Breakage of polycarbonate glazing.
    - e. Deterioration of insulating-glass hermetic seal.
  - 2. Warranty Period: Five years from date of Substantial Completion.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, products from VELUX America, LLC, which is located at: 104 Ben Casey Dr., Fort Mill, SC 29708, or comparable products by Wasco Products Inc., or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 DESIGN AND PERFORMANCE REQUIREMENTS**

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- A. Unit Skylight Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Thermal Transmittance: NFRC 100 maximum U-factor of 0.53.
2. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum SHGC 0.24.

**2.03 UNIT SKYLIGHTS**

- A. Description: Factory-assembled, deck mounted, unit consisting of wooden pre-finished interior frame and sash, exterior structurally glazed, roll-formed metal sash and frame cover, production fabricated glazing and anchorage.
- B. System: Outward opening.
- C. Mounting: Deck mounted, integral curb.
- D. Operation: Manual operator.
- E. Glazing: Dual sealed thermal pane, 95% argon gas, laminated, and with three layers LoE3 silver that increases visible light over standard low e coatings while lowering the solar heat gain.
- F. Condensation Control: Fabricate unit skylights with integral gutters and non-clogging weeps to collect and drain condensation to exterior.
- G. Thermal Break: Fabricate unit skylights with thermal barrier separating exterior and interior metal framing.
- H. Operable Systems: Equip operable unit skylights with manufacturer's standard hinges, chain driven operating hardware, and weather-sealing gaskets.
1. Manual Operator: Manufacturer's standard, rotary-crank extension device.
    - a. Pole Operator: Manual, 60-inches long.
- I. Screen: Manufacturer's standard insect screen.
- J. Flashing: Manufacturer's standard flashing kit approved for use with roofing materials specified for the Project, and for stacking skylight units side by side and over and under.
- K. Finishes:
1. Exterior Surfaces: Exposed exterior wood surfaces to be covered with roll formed maintenance free aluminum with Kynar 500 polyvinylidene fluoride resin finish. Color as selected by Architect from manufacturer's full range.
  2. Interior Surface: Stain grade wood.

**2.04 TUBULAR DAYLIGHTING SYSTEMS**

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- A. Description: Tubular unit skylight daylighting kits with exterior glazed opening, glazing retainers and gaskets, exterior flashing assembly with integral adjustable pivot device, reflective tunnel, interior diffuser assemblies, and accessories, as required to meet installation and performance requirements indicated.
- B. System: Pitched with rigid tunnel.
- C. Dome: Transparent, UV-resistant plastic dome.
  - 1. Size: 14-inch diameter.
  - 2. Dome Glazing: 0.25-inch minimum thickness injection molded transparent impact modified acrylic material; with UV-absorbing additive.
- D. Dome Flashing Assembly: Self-flashed.
- E. Reflective Tunnels: Manufacturers standard rigid or flexible reflective tunnel.
- F. Diffusers: Round ceiling diffuser assembly attached directly to bottom of reflective tunnel, with dual high visible light transmittance lenses separated by airtight seals providing insulating airspace, and paintable white acrylic trim ring.

**2.05 ACCESSORY MATERIALS**

- A. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other non-corrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened.
  - 1. Where removal of exterior exposed fasteners might allow access to building, provide non-removable fastener heads.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

- A. Examine openings, substrates, structural support, anchorage, 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.

**3.02 INSTALLATION**

- A. Coordinate installation of unit skylights with installation of substrates, vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.

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- B. Comply with recommendations in AAMA 1607 and with manufacturer's written instructions for installing unit skylights.
- C. Install unit skylights level, plumb, and true to line, without distortion.
- D. Anchor unit skylights securely to supporting substrates.
- E. Where aluminum surfaces of unit skylights will contact another metal or corrosive substrates, such as preservative-treated wood, apply bituminous coating on concealed metal surfaces or provide other approved permanent separation recommended in writing by unit skylight manufacturer.

3.03 **CLEANING**

- A. Clean exposed unit skylight surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes.
- B. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Remove and replace glazing that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect unit skylight surfaces from contact with contaminating substances resulting from construction operations.
- E. Unit Skylight Operating System: Clean and lubricate joints and hardware. Adjust for proper operation.

**END OF UNIT SKYLIGHTS**



**SECTION 08 71 00**

**DOOR HARDWARE**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Door Hardware as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Mechanical door hardware
    - b. Cylinders for door hardware specified in other Sections
- B. Related Work Specified Elsewhere:
  - 1. SECTION 08 16 00: Composite Doors

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Other Action Submittals:
  - 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
    - a. Submittal Sequence: Submit door hardware schedule concurrent with submission of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
    - b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
    - c. Content: Include the following information:
      - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
      - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
      - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish for each door hardware product.
      - 4) Fastenings and other pertinent information.
      - 5) Explanation of abbreviations, symbols, and codes contained in schedule.
      - 6) Mounting locations for door hardware.

- 7) List of related door devices specified in other Sections for each door and frame.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Test Reports: For Compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- C. Warranty: Special warranty specified in this Section.

**1.04 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware schedule.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI.
- C. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

**1.06 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- C. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

**1.07 WARRANTY**

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- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.
    - b. Faulty operation of doors and door hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
  2. Warranty Period: Ten years from date of Substantial Completion, unless otherwise indicated.

**PART 2 – PRODUCTS**

**2.01 SCHEDULED DOOR HARDWARE**

- A. Provide door hardware for each door as scheduled on Drawings to comply with requirements in this Section.
1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturer's products, unless otherwise noted.
  2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware as indicated in Part 2 Articles following. Products are identified by using door hardware designations, as follows:
1. Named Manufacturer's Products: Manufacturer and product designations are listed for each door hardware type required for the purpose of establishing minimum requirements.

**2.02 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products from Hager Companies which is located at: 139 Victor St., St. Louis, MO 63104 or comparable products by other manufacturers listed below.
- B. The following manufacturers are approved subject to compliance with requirements, for the product categories listed:
1. Hinges: Stanley, McKinney
  2. Locks and Latches: Schlage, Yale, Sargent
  3. Push/Pull Latches: Rockwood, Ives, Burns
  4. Deadbolts: Schlage, Yale, Sargent
  5. Cylinders: Schlage, Yale, Sargent
  6. Closers: LCN, Sargent, Dorma
  7. Protective Trim: Rockwood, Burns
  8. Stops and Holders: Rockwood, Ives
  9. Gasketing and Weatherstripping: National Guard, Pemko

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10. Thresholds: National Guard, Pemko
11. Silencers: Ives, Rockwood, Burns

**2.03 HINGES**

- A. Hinges shall be of one manufacturer as listed for continuity of design and consideration of warranty and shall be certified and listed by the following:
1. Butts and Hinges: ANSI/BHMA A156.1
  2. Template Hinge Dimensions: ANSI/BHMA A156.7
- B. Butt Hinges:
1. Hinge weight and size unless otherwise indicated in hardware sets:
    - a. Doors up to 36-inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.134-inch and a minimum of 4-1/2 inches in height.
    - b. Width of hinge is to be minimum required to clear surrounding trim.
  2. Base material unless otherwise indicated in hardware sets:
    - a. Exterior Doors: 304 Stainless Steel.
    - b. Stainless Steel ball bearing hinges shall have stainless steel ball bearings. Steel ball bearings are unacceptable.
  3. Quantity of hinges per door unless otherwise stated in hardware sets:
    - a. Doors 60-inches up to 90-inches in height provide 3 hinges.
  4. Hinge design and options unless otherwise indicated in hardware sets:
    - a. Hinges are to be of a square corner five-knuckle design, flat button tips and have ball bearings unless otherwise indicated in hardware sets.
    - b. Out-swinging exterior and out-swinging access controlled doors shall have non-removable pins (NRP) to prevent removal of pin while door is in closed position.
    - c. When shims are necessary to correct frame or door irregularities, provide metal shims only.
  5. Basis of Design Product: Hager BB1168/BB1199 heavy weight.

**2.04 LOCKS AND LATCHES (CYLINDRICAL)**

- A. Locks and latches shall be of one manufacturer as listed for continuity of design and consideration of warranty. Product to be certified and listed by following:
1. ANSI/BHMA A156.2 Series 4000 Certified to Grade 1.
  2. ANSI/BHMA A250.13 Certified for a minimum design load of 1150 lbf for single out swinging doors measuring 36-inches in width and 84-inches in height and a minimum design load of 1150 lbf for out swinging single doors measuring 48-inches in width and 84-inches in height.
  3. UL/cUL Labeled and listed for functions up to 3 hours for single doors up to 48-inches in width and up to 96-inches in height.
  4. UL10C/UBC 7-2 Positive Pressure Rated.
  5. ICC/ANDI A117.1.
- B. Lock and latch function numbers and descriptions of manufacturer's series as listed in hardware sets. Material and Design:

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1. Lock and Latch chassis to be Zinc dichromate for corrosion resistance.
2. Keyed functions to be of a freewheeling design to help resist against vandalism.
3. Non-handed, field reversible.
4. Thru-bolt mounting with no exposed screws.
5. Levers shall be Zinc cast and plated to match finish designation in hardware sets.
6. Roses shall be of solid Brass or Stainless Steel material.

C. Latch and Strike:

1. Stainless Steel latch bolt with minimum of 1/2-inch throw and deadlocking for keyed and exterior functions. Provide 3/4-inch latchbolt for pairs of fire rated doors where required by door manufacture. Standard backset to be 2-3/4 inches and faceplate shall be adjustable to accommodate a square edge door or a standard 1/8-inch beveled edge door.
2. Strike is to fit a standard ANSI A115 prep measuring 1-1/4 inches by 4-7/8 inches with proper lip length to protect surrounding trim.

D. Basis of Design Product: Hager 3400 Series with "August" Lever.

**2.05 DEADBOLTS**

A. Deadbolts shall be of one manufacturer as listed for continuity of design and consideration of warranty. Manufacturer to be certified by the following:

1. Auxiliary Locks: ANSI/BHMA A156.5 Grade 1.
2. UL/cUL listed for functions up to 3 hours for "A" label.
3. UL10C/UBC 7-2 Positive Pressure Rated.

B. Deadbolt function numbers and descriptions of manufacturer's series as listed in hardware sets. Material and Design:

1. Latch bolt: 1-inch throw; Material: brass with concealed hardened steel roller to prevent sawing or cutting.
2. Freewheeling collar design to help resist against vandalism.
3. Non-handed, field reversible.

C. Basis of Design Product: Hager 3100 Series

**2.06 CYLINDERS AND KEYING**

A. Cylinders shall be of one manufacturer as listed for continuity of design and consideration of warranty.

B. Cylinders:

1. ANSI A156.5, Grade 1, 6-pin type removable cylinders.
2. Shall be furnished with cams/tailpieces as required for locking device that is being furnished for project.

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- C. Keying: Keyed in like-groups.
1. Include construction keying.
  2. Keys: Nickel silver.
  3. Supply keys in the following minimum quantities:
    - a. 2 change keys for each lock.
- D. Basis of Design Product: Hager 3900 Series

**2.07 CLOSERS**

- A. Shall be product of one manufacturer. Unless otherwise indicated on hardware schedule, comply with manufacturer's recommendation for size of closer, depending on width of door, frequency of use, atmospheric pressure, ADAAG requirements, and fire rating. Manufacturer to be certified and or listed by the following:
1. BHMA Certified ANSI A156.4 Grade 1.
  2. ADA Compliant ANSI A117.1.
  3. UL/cUL Listed up to 3 hours.
  4. UL10C Positive Pressure Rated.
  5. UL10B Neutral Pressure Rated.
- B. Material and Design:
1. Provide cast iron non-handed bodies with full plastic covers.
  2. Closers shall have separate staked adjustable valve screws for latch speed, sweep speed, and backcheck.
  3. Provide Tri-Pack arms and brackets for regular arm, top jamb, and parallel arm mounting.
  4. One-piece seamless steel spring tube sealed in hydraulic fluid.
  5. Double heat-treated steel tempered springs.
  6. Precision-machined heat-treated steel piston.
  7. Triple heat-treated steel spindle.
  8. Full rack and pinion operation.
- C. Mounting:
1. Out swing doors shall have surface parallel arm mount closers except where noted on hardware schedule.
  2. In swing doors shall have surface regular arm mount closers except where noted on hardware schedule.
  3. Provide brackets and shoe supports for aluminum doors and frames to mount fifth screw.
  4. Furnish drop plates where top rail conditions on door do not allow for mounting of closer and where backside of closer is exposed through glass.
- D. Size closers in compliance with requirements for accessibility (ADAAG). Comply with following maximum opening force requirements. Interior hinged openings: 5.0 lb. Fire rated and exterior openings shall have a minimum opening force allowable by authorities having jurisdiction.

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- E. Fasteners: Provide self-reaming and self-tapping wood and machine screws and hex nuts and bolts for each closer.
- F. Basis of Design Product: Hager 5100 Series.

**2.08 PROTECTIVE TRIM**

- A. Size of Protection Plate: Single doors, size 2-inches less door width on push side of door and 1-inch less on pull side of door. For pairs of doors, size 1-inch less door width on push side of door, and 1/2-inch on pull side of door. Kick plates 10-inches high or sized to door bottom rail height. Manufacturer shall meet requirements for:
  - 1. Architectural Door Trim: ANSI/BHMA A156.6.
  - 2. UL.
- B. Material and Design:
  - 1. 0.050-inch stainless steel.
  - 2. Corners shall be square. Polishing lines or dominant direction of surface pattern shall run across the door width of plate.
  - 3. Bevel top, bottom and sides uniformly leaving no sharp edges. Edges shall be deburred.
  - 4. Countersink holes for screws. Screw holes shall be spaced equidistant 8-inches center to center, along a centerline not over 1/2-inch in from edge around plate. End screws shall be a maximum of 0.53-inch from corners.
- C. UL Label stamp required on protection plates when top of plate is more than 16-inches above bottom of door on fire rated openings. Verify door manufacturers UL listing for maximum height and width of protection plate to be used.
- D. Basis of Design Product: Hager 194S.

**2.09 STOPS AND HOLDERS**

- A. Wall Stops: Provide door stops wherever necessary to prevent door or hardware from striking an adjacent partition or obstruction. Provide wall stops when possible. Door stops and holders mounted in concrete floor or masonry walls shall have stainless steel machine screws and lead expansion shields. Manufacturer shall meet requirements for Auxiliary Hardware: ANSI/BHMA A156.16.
- B. Basis of Design Product: Hager 255S, 256S (holder)

**2.10 DOOR GASKETING AND WEATHERSTRIP**

- A. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing where indicated on hardware schedule. Provide non-corrosive fasteners for exterior applications.
  - 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

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2. Door Bottoms: Apply to bottom of door, forming seal with threshold or floor when door is in closed position.
  3. Sound Gasketing: Cutting or notching for stop mounted hardware not permitted.
- B. Standards: Manufacturer shall meet requirements for:
1. Door Gasketing and Edge Seal Systems: ANSI/BHMA A156.22.
  2. Shall be BHMA certified for door sweeps, automatic door bottoms, and adhesive applied gasketing.
- C. Basis of Design Products:
1. Weather Stripping: 881S.
  2. Door Bottom Sweeps: Hager 750S.

**2.11 THRESHOLDS**

- A. Set thresholds for exterior and acoustical openings in full bed of sealant with lead expansion shields and stainless steel machine screws complying with requirements specified in Section 07 92 00 "Joint Sealants". Notched in field to fit frame by hardware installer. Refer to Drawings for special details. Manufacturer to be certified by the following:
1. Thresholds: ANSI/BHMA A156.21.
  2. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
- B. Basis of Design Products:
1. Saddle Threshold: Hager 413S

**2.12 SILENCERS**

- A. Where smoke, light, or weather seals are not required, provide three silencers per single door frame. Manufacturer shall meet requirements for Auxiliary Hardware: ANSI/BHMA A156.16.
- B. Basis of Design Product: Hager 307D for hollow metal frames; 308D for wood frames.

**2.13 FINISHES**

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- 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.



### **PART 3 – EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine doors and frames, with installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 INSTALLATION**

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30-inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period. Provide and install permanent cores and keying at Substantial Completion and test for smooth operation.
- E. Thresholds: Set thresholds for exterior doors and other doors indicated in a full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants."
- F. Stops: Provide wall stops for doors unless other stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- H. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

#### **3.03 ADJUSTING**

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- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

**3.04 CLEANING AND PROTECTION**

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.
- D. Leave manufacturer's protective film intact and provide proper protection for all other finish hardware items that do not have protective material from manufacturer until Architect accepts Project as complete.

**3.05 HARDWARE SET SCHEDULE**

- A. Guide: Door hardware items have been placed in sets which are intended to be a guide of design, grade, quality, function, operation, performance, exposure, and like characteristics of door hardware, and may not be complete. Provide door hardware required to make each set complete and operational.
- B. Hardware schedule does not reflect handing, backset, method of fastening and like characteristics of door hardware and door operation.
- C. Review door hardware sets with door types, frames, sizes and details on drawings. Verify suitability and adaptability of items specified in relation to details and surrounding conditions.
- D. The following hardware sets list items of finish hardware required for each opening. The quantities of each type are the responsibility of the finish hardware supplier.
  - 1. SET #1 (Accessible Shower Rooms): Finish US26D
    - a. Butt hinges
    - b. Cylindrical latchset; Corridor function; "August" lever
    - c. Closer
    - d. Kick plate
    - e. Stop
    - f. Perimeter gasketing
    - g. Door bottom
    - h. Threshold
  - 2. SET #2 (Shower Rooms): Finish US26D
    - a. Butt hinges

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- b. Cylindrical latchset; Corridor function; "August" lever
  - c. Closer
  - d. Kick plate
  - e. Wall stop
  - f. Perimeter gasketing
  - g. Door bottom
  - h. Threshold
3. SET #4 (Chase): Finish US26D
- a. Butt hinges
  - b. Cylindrical deadbolt; Double cylinder function
  - c. Latchset; Passage function; "August" lever
  - d. Kick plate
  - e. Wall stop
  - f. Perimeter gasketing
  - g. Door bottom
  - h. Threshold

**END OF DOOR HARDWARE**

**SECTION 09 29 00**

**GYPSUM BOARD**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Gypsum Board as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Gypsum board
- B. Related Work Specified Elsewhere:
  - 1. SECTION 06 10 00: Rough Carpentry
  - 2. SECTION 09 91 00: Painting

**1.02 SUBMITTALS**

- A. Product Data: For each type of product.

**1.03 DELIVERY, STORAGE AND HANDLING**

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

**1.04 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 paper-faced gypsum panels 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, and 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**

**2.01 PERFORMANCE REQUIREMENTS**

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- A. Moisture and Mold-Resistant Assemblies: Provide and install moisture and mold-resistant glass-mat gypsum board products with moisture-resistant surfaces complying with ASTM C 1658 and ASTM C 1177 where indicated on Drawings and in all locations which might be subject to moisture exposure during construction.

**2.02 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products from Georgia-Pacific Gypsum or comparable products by National Gypsum, USG Corporation or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.03 GYPSUM BOARD, GENERAL**

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

**2.04 INTERIOR GYPSUM BOARD**

- A. Gypsum Wallboard (GWB): ASTM C 1396/C 1396 M.
  - 1. Basis of Design Product: ToughRock Gypsum Board.
  - 2. Thickness: As indicated on the Drawings
  - 3. Long Edges: Tapered
- B. Gypsum Ceiling Board: ASTM C 1396/C 1396 M.
  - 1. Basis of Design Product: DensArmor Plus High-Performance Interior Panel
  - 2. Thickness: As indicated on Drawings.
  - 3. Long Edges: Tapered.
- C. Moisture and Mold-Resistant Gypsum Board (M.R. GWB): ASTM C 1396/C 1396M. With moisture and mold resistant core and paper surfaces.
  - 1. Basis of Design Product: DensArmor Plus High-Performance Interior Panel or DensArmor Plus Fireguard High-Performance Interior Panel as required.
  - 2. Core: As indicated.
  - 3. Long Edges: Tapered.
  - 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- D. Glass-Mat Gypsum Sheathing Board (G.M. GWB): ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.
  - 1. Basis of Design Product: DensGlass Sheathing.
  - 2. Core: As indicated.

**2.05 TRIM ACCESSORIES**

- A. Interior Trim: ASTM C 1047

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes: As required and as noted on Drawings.

## **2.06 JOINT TREATMENT MATERIALS**

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
1. Gypsum Board: Paper.
  2. Glass-Mat Gypsum Wallboard: 10-by-10 fiberglass mesh.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints, rounded or beveled panel edges, 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.
  3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  4. Finish Coat: For third coat, use drying-type, all-purpose compound.

## **2.07 AUXILIARY MATERIALS**

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. 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.

## **PART 3 – EXECUTION**

### **3.01 EXAMINATION**

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, 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.

### **3.02 APPLYING AND FINISHING PANELS, GENERAL**

- A. Comply with ASTM C 840.

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- 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 or 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. 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.
- G. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

**3.03 APPLYING INTERIOR GYPSUM BOARD**

- A. 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 horizontally (perpendicular 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.

**3.04 INSTALLING TRIM ACCESSORIES**

- A. General: For trim with back flanges intended for fasteners, attached to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

**3.05 FINISHING GYPSUM BOARD**

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- 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 for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for tile.
  - 3. Level 3: Where indicated on Drawings.
  - 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
- E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

**3.06 PROTECTION**

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. 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 GYPSUM BOARD**



**SECTION 09 67 23**

**RESINOUS FLOORING**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Resinous Flooring as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Decorative resinous flooring systems
    - b. Integral resinous base
- B. Related Work Specified Elsewhere:
  - 1. SECTION 03 30 00: Cast-In-Place Concrete
  - 2. SECTION 06 10 00: Rough Carpentry

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Samples for Initial Selection: For each type of exposed finish required.
- C. Samples for Verification: For each resinous flooring system required, 6 inches square, applied to a rigid backing by Installer for this Project.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- B. Material Certificates: For each resinous flooring component, from manufacturer.
- C. Material Test Reports: For each resinous flooring system.

**1.04 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For resinous flooring to include in maintenance manuals.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of flooring systems required for this Project.

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1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

**1.06 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

**1.07 PROJECT CONDITIONS**

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close space to traffic during resinous flooring application and for not less than 24 hours after application unless manufacturer recommends a longer period.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products from Dur-A-Flex, Inc. which is located at: 95 Goodwin Street, East Hartford, CT 06108, or comparable products by Key Resin Company, Laticrete, Sherwin Williams, or approved equal.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

**2.02 RESINOUS FLOORING**

- A. Resinous Flooring: Abrasion-, impact-, and chemical-resistant, aggregate- or pigment-filled, and resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.
- B. System Characteristics:
  1. Color and Pattern: Solid color with decorative-quartz broadcast.
  2. Wearing Surface: Textured for slip resistance.
  3. Overall System Thickness: 3/16 inch.
- C. Primer: Type recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated.

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1. Formulation Description: High solids.
- D. Waterproofing Membrane: Type recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated.
1. Formulation Description: High solids.
- E. Reinforcing Membrane: Flexible resin formulation that is recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated and that inhibits substrate cracks from reflecting through resinous flooring.
1. Formulation: High solids.
    - a. Provide fiberglass scrim embedded in reinforcing membrane.
- F. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- G. Body Coats:
1. Resin: Epoxy
  2. Formulation Description: 100 percent solids.
  3. Type: Pigmented.
  4. Number of Coats: One
  5. Thickness of Coats: 1/16 inch.
  6. Aggregates: Colored quartz.
- H. Grout Coat:
1. Resin: Epoxy.
  2. Formulation Description: 100 percent solids.
  3. Type: Clear.
  4. Thickness of Coats: 1/16 inch.
- I. Top Coats: Sealing or finished coats
1. Resin: Urethane.
  2. Formulation Description: High solids.
  3. Type: Clear.
  4. Number of Coats: One.
  5. Thickness of Coats: 1/16 inch.
  6. Finish: Matte.
  7. Aggregate: Traction additive as needed for increased traction.
- J. System Physical Properties: Provide resinous flooring system with the following minimum physical requirements when tested according to test methods indicated:
1. Adhesion: 400+ concrete fracture per ASTM D 4541.
  2. Tensile Strength: 4,500-5,000 per ASTM D 638.
  3. Impact Direct/Reverse: 160/160 per ASTM D 2794 Inch Pounds.

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4. Abrasion Resistance: 22-28 maximum weight loss per ASTM D 4060.
5. Flammability: Self-extinguishing per ASTM D 635.
6. Hardness: 84, Shore D per ASTM D 2240.
7. Full Chemical Resistance: 7 days.

**PART 3 – EXECUTION**

**3.01 PREPARATION**

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
  1. Roughen concrete substrates as follows:
    - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within apparatus, and recirculates the shot by vacuum pickup.
  2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
  3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
    - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/1000 sq. ft. of slab area in 24 hours.
    - b. Plastic Sheet Test: ASTM D 4263. Proceed with application only after testing indicates absence of moisture in substrates.
    - c. Relative Humidity Test: Use in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
  4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- C. Plywood Substrates: Provide plywood substrate that is sound and non-flexing under the expected load.
  1. Plywood substrate shall be exterior or marine grade plywood, new, clean, and smooth finish (NO KNOTS).
  2. Provide two layers with staggered joints. Plywood shall be positively fastened with a high quality construction adhesive as well as a 6-inch screw pattern.
  3. Plywood substrates shall be prepared according to manufacturer's recommendations.
- D. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

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1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.
- E. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

**3.02 APPLICATION**

- A. Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
  2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing process.
  3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- B. Primer: Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Waterproofing Membrane: Apply waterproofing membrane, over entire substrate surface, in manufacturer's recommended thickness.
1. Apply waterproofing membrane to integral cove base substrates.
- D. Reinforcing Membrane: Apply reinforcing membrane to substrate cracks.
- E. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.
1. Integral Cove Base: 6-inches high.
- F. Self-Leveling Body Coats: Apply self-leveling slurry body coats in thickness indicated for flooring system.
1. Aggregates: Broadcast aggregates at rate recommended by manufacturer and, after resin is cured, remove excess aggregates to provide surface texture indicated.
- G. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel marks and roughness using method recommended by manufacturer.
- H. Grout Coat: Apply grout coat, of type recommended by resinous flooring manufacturer, to fill voids in surface of final body coat and to produce wearing surface indicated.
- I. Topcoats: Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer and to produce wearing surface indicated.

**3.03    PROTECTION**

- A.     Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

**END OF RESINOUS FLOORING**

**SECTION 09 91 00**

**PAINTING**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Painting as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
1. The Work shall include, but shall not necessarily be limited to:
    - a. Painting and finishing of all interior and exterior exposed items and surfaces, and any other surfaces indicated on the Drawings or herein specified to receive paint.  
NOTE: Special attention shall be given to the proper priming of all sides and edges of all exterior wood to be painted.
    - b. All necessary surface preparation and priming.
    - c. Field testing compatibility of new paint with existing paint or finishes to be covered.
  2. The painting subcontractor shall fully examine all Drawings and Specification Sections to determine scope of their provisions regarding painting and finishing. All surfaces that are primed or left unfinished by the requirements of other Sections of the Specifications shall be painted or finished as a part of this Section.
  3. The painting subcontractor shall examine the Drawings and note new patches in existing construction. In cases where new finishes are not scheduled for the existing construction, new patches shall be finished to match existing.
- B. The following categories of work are not included as part of field-applied painting and finishing Work.
1. Prefinished Items: Unless otherwise indicated, painting is not required on items specified for factory- or installer-finishing.
  2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces in concealed areas and generally inaccessible areas, foundation spaces, furred areas, attics, utility tunnels and pipe spaces, and elevator and duct shafts.
  3. Finished Metal Surfaces: Unless otherwise indicated, painting is not required on metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials.
  4. Operating Parts: Painting is not required on moving parts of operating units, mechanical and electrical parts such as valve and damper operators, linkages, sensing devices, and motor and fan shafts.
- C. Do not paint over any code-required labels, such as Underwriters' Laboratories (UL) and Factory Mutual (FM), or any equipment identification, performance rating, name, or nomenclature plates.

**1.02 DEFINITIONS**

- A. Definitions of Painting Terms: In accordance with ASTM D 16, unless otherwise specified.

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- B. Dry Film Thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000 inch).
- C. Paints are available in a wide range of sheens or glosses, as measured by a gloss meter from a 60 and/or 85 degree angle from vertical, as a percentage of the amount of light that is reflected. The following terms are used to describe the gloss of the products specified. The list below is provided for general guidance; refer to the technical data sheet for the actual gloss/sheen level for each product.
  - 1. Flat: Less than 5 Percent.
  - 2. Eggshell: 5 – 20 Percent.
  - 3. Satin: 20 – 35 Percent.
  - 4. Semi-Gloss: 30 – 65 Percent.
  - 5. Gloss: Over 65 Percent.

**1.03 ACTION SUBMITTALS**

- A. Product Data: Provide a complete list of all products to be used, with the following information for each.
  - 1. Manufacturer's name, product name and/or catalog number, and general product category.
  - 2. Cross-reference to specified paint system(s) that the product is to be used in; include description of each system.
- B. Samples for Initial Selection: For each product specified, color chips indicating manufacturers full range of available colors and sheens.
- C. Samples for Verification: Paper samples, 5 inches by 7 inches in size, illustrating selected colors for each color and system selected with specified coats cascaded.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years' experience.
- B. Installer Qualifications: All products listed in this section are to be applied by a Painting Contractor with a minimum of five years demonstrated experience in surface preparation and field application of the same type and scope as specified.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Store materials in an area that is within the acceptable temperature range per manufacturer's instructions. Protect from freezing.



**1.06 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity and ventilation) within the limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Do not apply paint in snow, rain, fog or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

**1.07 EXTRA MATERIALS**

- A. At project closeout, supply the Owner or owner's representative one gallon of each product for touch-up purposes. Cans shall be clearly marked with color name, number and type of paint.
- B. At project closeout, provide the color mixture name and code to the Owner or owner's representative for accurate future color matching.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
  - 1. Duron, Inc.
  - 2. Benjamin Moore & Company
  - 3. Pratt & Lambert
  - 4. PPG Pittsburg Paints
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 MATERIALS, GENERAL**

- A. Paints and Coatings:
  - 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturers product instructions.
  - 2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufacturers product instructions for optimal color conformance.
- B. Compatibility: Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

- C. Colors: As selected by the Architect from manufacturer's full range.

### **PART 3 – EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Ensure that moisture-retaining substrates to receive paint have moisture content within tolerances allowed by coating manufacturer.
- C. Examine surfaces to receive coatings for surface imperfections and contaminants that could impair performance or appearance of coatings, including but not limited to, loose primer, rust, scale, oil, grease, mildew, algae, or fungus, stains or marks, cracks, indentations, or abrasions.
- D. Correct conditions that could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

#### **3.02 SURFACE PREPARATION**

- A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Cleaning: Before applying paint or surface treatments, clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint system indicated.
- D. Existing Coatings:
1. Remove surface irregularities by scraping or sanding to produce uniform substrate for coating application; apply one coat primer of type recommended by coating manufacturer for maximum coating adhesion.
  2. If presence of lead in existing coatings is suspected, cease surface preparation and notify Architect immediately.

- E. Wood:

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1. Seal knots, pitch streaks, and sap areas with sealer recommended by coating manufacturer, fill nail recesses and cracks with filler recommended by coating manufacturer; sand surfaces smooth.
2. Remove mill marks and ink stamped grade marks.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

**3.03 APPLICATION**

- A. Apply each coat to a uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.
- B. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
- C. Inspect each coat before applying next coat; touch-up surface imperfections with coating material, feathering, and sanding if required; touch-up areas to achieve flat, uniform surface without surface defects visible from 5-feet.
- D. Remove dust and other foreign materials from substrate immediately prior to applying each coat.
- E. Where paint application abuts other materials or other coating color, terminate coating with a clean sharp termination line without coating overlap.
- F. Where color changes occur between adjoining spaces through framed openings that are of the same color as adjoining surfaces, change color at outside stop corner nearest to face of closed door.
- G. Re-prepare and re-coat unsatisfactory finishes; refinish entire area to corners or other natural terminations.
- H. Interior wood trim to be painted shall be back-primed before installation with an interior wood primer.
- I. Exterior wood trim to be painted shall be back-primed before installation with exterior wood primer. Edges of exterior plywood shall be similarly primed before installation.

**3.04 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

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- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced surfaces.

**3.05 PAINTING AND COATING SCHEDULE**

A. Exterior Painting:

1. Ferrous Metal, Galvanized Metal and Aluminum:

- Prime Coat: Primer, water-based, anti-corrosive for metal: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
- Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
- Topcoat: Light industrial coating, exterior, water based, gloss: S-W Pro Industrial Acrylic Gloss Coating, B66-600 Series, at 2.5 to 4.0 mils dry, per coat.

2. Wood:

- Prime Coat: Primer, latex for exterior wood.
- Intermediate Coat: Latex, exterior, matching topcoat.
- Topcoat: Latex, exterior satin: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
- Topcoat (Trim): Latex, exterior, gloss: S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils wet, 1.3 mils dry, per coat.

B. Interior Painting:

1. Metals (Aluminum, Steel, Galvanized Steel):

a. Ferrous Metal (except as otherwise scheduled):

- Prime Coat: Primer, rust-inhibitive, water based: S-W Pro Industrial Pro-Cryl Universal primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry
- Intermediate Coat: Water-based acrylic, interior, matching topcoat
- Topcoat: Water-based acrylic, semi-gloss: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.

2. Wood:

- Prime Coat: Primer sealer, latex, interior: S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry
- Intermediate Coat: Latex, interior, matching topcoat

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- Topcoat: Latex, interior, semi-gloss: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.

3. Gypsum Board:

a. Walls

- Prime Coat: Primer, latex, interior: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry
- Intermediate Coat: Latex, interior, matching topcoat
- Topcoat: Latex, interior, eggshell: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat

b. Walls (Toilet rooms, showers, kitchens and mechanical spaces):

- Prime Coat: Primer sealer, latex, interior: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry
- Intermediate Coat: Light industrial coating, interior, water based, matching topcoat
- Topcoat: Light industrial coating, interior, water based, eggshell: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat

4. Disturbed Work: Disturbed work both interior and exterior caused by construction shall be thoroughly cleaned, repaired and sanded, and given sufficient coats of paint of color to match adjacent work so that the finished work will blend satisfactorily with existing work as approved by the Owner. Test patches shall be made to demonstrate compatibility of new paint materials with existing surfaces.

**END OF PAINTING**

**SECTION 09 93 00**

**STAINING AND TRANSPARENT FINISHING**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Staining and Transparent Finishing as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Interior and exterior stains and clear finishes.
    - b. All necessary surface preparation
- B. Related Work Specified Elsewhere:
  - 1. SECTION 06 20 00: Finish Carpentry
  - 2. SECTION 07 46 23: Wood Siding

**1.02 DEFINITIONS**

- A. Stains are available in a wide range of opacities from transparent stain that allow all the grain and texture to show to solid colors which mask all the grain but allow the texture to show. The following terms are used to describe the different opacities.
  - 1. Transparent
  - 2. Semi Transparent
  - 3. Semi Solid
  - 4. Solid Color
- B. Varnishes and clear coats are available in a wide range of sheens or glosses, as measured by a gloss meter from a 60 degree angle from vertical, as a percentage of the amount of light that is reflected. The following terms are used to describe gloss levels.
  - 1. Flat: 10 – 20 percent
  - 2. Satin / Low Lustre: 20 – 35 percent
  - 3. Semi-Gloss: 35 – 70 percent
  - 4. Gloss: Over 70 percent

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of product indicated.

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C. Product List: For each product indicated, include the following:

1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in Schedules.

**1.04 MAINTENANCE MATERIAL SUBMITTAL**

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Stains and Transparent Finishes: 5 percent, but not less than 1 gallon of each material and color applied.

**1.05 QUALITY ASSURANCE**

A. Manufacturers Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years' experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum five years demonstrated experience in installing products of the same type and scope as specified.

**1.06 DELIVERY, STORAGE AND HANDLING**

A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

**1.07 PROJECT CONDITIONS**

A. Apply finishes only when temperatures of surfaces to be finished and ambient air temperatures are between 50 and 95 degrees F.

B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

A. Basis of Design: Subject to compliance with requirements, provide products from one of the following:

1. Benjamin Moore & Co.
  2. Cabot
  3. Minwax
  4. PPG Architectural Coatings
  5. Sherwin-Williams Company (The)
- B. Products: Subject to compliance with requirements, provide product listed in wood finish systems schedule, or approved equal, for the product category indicated.

## **2.02 MATERIALS, GENERAL**

- A. Material Compatibility:
1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.
- B. Stain Colors: As selected by Architect from manufacturer's full range.

## **2.03 MIXING AND TINTING**

- A. Except where specifically noted in this Section, all stain shall be ready-mixed and pre-tinted. Agitate all stain prior to and during application to ensure uniform color, gloss, and consistency.
- B. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.
- C. Where paint is to be sprayed, thin according to manufacturer's current guidelines.

## **PART 3 – EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.



### **3.02    PREPARATION**

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
  - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
  - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
  - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Exterior Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Prime edges, ends, faces, undersides, and backsides of wood.
    - a. For solid hide stained wood, stain edges and ends after priming.
    - b. For varnish coated stained wood, stain edges and ends and prime with varnish. Prime undersides and backsides with varnish.
  - 3. Countersink steel nails, if used, and fill with putty or plastic wood filler tinted to final color. Sand smooth when dried.
- E. Interior Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth glasslike finish.
  - 3. Sand surfaces that will be exposed to view and dust off.
  - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

### **3.03    APPLICATION**

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
  - 1. Use applicators and techniques suited for finish and substrate indicated.
  - 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.

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3. Do not apply finishes over labels or independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

**3.04 CLEANING AND PROTECTION**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do no scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced wood surfaces.

**3.05 STAINING AND FINISHING SCHEDULE**

- A. Exterior Staining and Finishing:
  1. Wood timber:
    - a. Opacity: Translucent
    - b. Basis of Design Product: PPG Proluxe (Sikkens) Cetol WB SRD
  2. Wood siding:
    - a. Opacity: Solid
    - b. Basis of Design Product: Cabot Solid Color Acrylic Siding Stain or PPG ProLuxe (Sikkens) Rubbol Solid Wood Finish
- B. Interior Staining and Finishing:
  1. Wood paneling, trim including baseboard, and casing:
    - a. 1<sup>st</sup> Coat: Minwax Performance Series Tintable Wood Stain 250 VOC Formula
    - b. 2<sup>nd</sup> Coat: Minwax Performance Series Sanding Sealer
    - c. 3<sup>rd</sup> Coat: Minwax Performance Series Fast-Dry Oil Varnish

**END OF STAINING AND TRANSPARENT FINISHING**

**SECTION 10 14 00**

**SIGNAGE**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Signage as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Interior Signage
    - b. Accessories

**1.02 SUBMITTALS**

- A. Product Data: Manufacturer's illustrated product literature and specifications to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- B. Shop Drawings: Submit shop drawings indicating sign style, lettering font, foreground and background colors, locations, and overall dimensions of each sign.
- C. Selection Samples: For each finished product specified, a complete set of color chips representing manufacturer's full range of available colors and patterns.

**1.03 QUALITY ASSURANCE**

- A. Manufacturers Qualifications: Company specializing in manufacturing Products specified in this Section with minimum three years documented experience.
- B. ADA Accessibility Guidelines: Signage shall comply with the ADA Accessibility Guidelines where applicable. Characters and graphics, including but not limited to, copy height, letter stroke, symbols, materials, and finishes indicated on the Drawings are intended as guidelines for compliance. Implement each applicable ADA Guideline. Should conflicts arise, notify the Architect before proceeding.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Package signs, labeled in name groups.

**1.05 PROJECT CONDITIONS**

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- A. Maintain environmental conditions (temperature, humidity and ventilation) within the limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

**1.06 WARRANTY**

- A. Manufacturer's Warranty: Signage is to be guaranteed for the life of the property against defects in materials and workmanship.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products from Encompass Sign Systems which is located at: 2401 Nevada Ln N, Golden Valley, MN 55427, or comparable products by Kroy Sign Systems or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 THERMOFORM ACRYLIC SIGNS**

- A. Materials
  - 1. 100% Post-Consumer Recycled ABS Plastic suitable for both interior and exterior applications.
  - 2. Acrylic with a tensile strength that meets ASTM D-638 and a flexural strength that meets ASTM D-790. It shall have a self-ignition temperature that meets ASTM D-1929 with a burn rate meeting ASTM D-635, and measuring at D-785 on the Rockwell Hardness scale. Suitable for both interior and exterior environments.
  - 3. Decorative laminate and elements as requested.
- B. Fabrication:
  - 1. Thermoformed plate shall be laser or rotary cut for precise dimensions according to specifications.
  - 2. Characters and pictograms shall be compression molded and raised 1/32" to meet ADA compliance regulations.
  - 3. Raised text shall be in all capital letters and accompanied by corresponding Grade 2 Braille.
- C. Signs:
  - 1. Colors:
    - a. Text and graphics as selected by Architect from manufacturer's standard range.
    - b. Background as selected by Architect from manufacturer's standard range.
  - 2. Sign sizes as shown on drawings for each sign type required.
  - 3. Text Size: 5/8-inch minimum to 2-inch maximum based on a capital letter "I" spaced a minimum of 1/4-inch away from other lines.

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4. Font to be selected by Architect from Manufacturer's standard styles.
5. Grade 2 Braille to accompany raised text. Braille to be a minimum of 3/8-inch away from all other raised elements and sign edges for ADA compliance.
6. Pictograms to be provided as required, and accompanied by the International Symbol of Accessibility when necessary.
7. Back Plate Thickness: 1/8-inch minimum.
8. Corners: Radius
9. Edges: Straight
10. Texture: Smooth
11. Vector format image(s) to be provided by Architect for any specialty artwork required on signage.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

- A. Verify walls are free of debris and ready for installation of signage prior to proceeding.
- B. Notify Architect of unsatisfactory conditions before proceeding.

**3.02 INSTALLATION**

- A. Signs to be installed 60-inches above finished floor to baseline of highest tactile copy maximum, and 48-inches above finished floor to baseline of lowest tactile copy minimum.
- B. Signs to be located 3-inches from latch side of door jamb. Where there is insufficient wall space, signs will be installed on nearest adjacent wall.
- C. Signs to be installed level and plumb.
- D. Signs to be installed with manufacturer's recommended mounting hardware.

**3.03 CLEANING AND PROTECTION**

- A. Clean signs in accordance with manufacturer's written instructions.
- B. Protect installed products until completion of project.
- C. Signs shall be free of glue, fingerprints, dirt, grease and any other imperfections.
- D. Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SIGNAGE**

**SECTION 10 21 00**

**COMPARTMENTS AND CUBICLES**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Compartments and Cubicles as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Phenolic core toilet compartments configured as toilet enclosures and urinal screens
    - b. Phenolic core benches
- B. Related Work Specified Elsewhere:
  - 1. SECTION 10 28 00: Toilet, Bath and Laundry Accessories

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Show locations of cutouts for compartment mounted toilet accessories.
  - 2. Show locations of reinforcement for compartment mounted grab bars.
  - 3. Show locations of centerlines of toilet fixtures.
- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
  - 1. Each type of material, color, and finish required for units, prepared on 6-inch square Samples of same thickness and material indicated for Work.
  - 2. Each type of hardware and accessory.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Product Certificates: For each type of toilet compartment, from manufacturer.

**1.04 CLOSEOUT SUBMITTALS**

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- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

**1.05 QUALITY ASSURANCE**

- A. Manufacturers Qualifications: Manufacturer of products specified in this Section, with minimum five years' experience in the manufacture of toilet compartments.
- B. Installer Qualifications: Experienced Installer regularly engaged in installation of toilet compartments for minimum three years.
- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- D. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

**1.06 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.

**1.07 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

**1.08 WARRANTY**

- A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship during the following period after substantial completion:

1. Phenolic Core Toilet Partitions: Against delamination: 3 years.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products from Bobrick Washroom Equipment, Inc., or comparable products by Bradley Corporation, Accurate Partitions Corporation or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 MATERIALS**

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- A. Phenolic Core: Compressed cellulose impregnated with phenolic resins. Provide smooth material, without creases or ripples.
- B. Aluminum Castings: ASTM B 26/B 26M.
- C. Aluminum Extrusions: ASTM B 221.
- D. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- E. Stainless-Steel Castings: ASTM A 743/A 743M.

**2.03 PHENOLIC CORE TOILET COMPARTMENTS**

- A. Toilet Compartment Type: Ceiling Hung.
- B. Urinal Screen Style: Floor-Anchored.
  - 1. Screen Height: 48-inches with 12-inches floor clearance.
- C. Door, Panel, and Stile Construction, General: Form edges square without crown molding. Finish edges smooth.
  - 1. Provide exposed surfaces free of pitting, visible seams and fabrication marks, stains, telegraphing of core material, or other imperfections.
  - 2. Core Material: Manufacturer's standard solid resin core of thickness required to provide finished thickness for doors, panels and stiles.
- D. Stile and Door Construction: 3/4-inch thick.
- E. Panel and Screen Construction: 1/2-inch thick.
- F. Overhead Brace: Provide 3/4-inch by 3-1/2 inch solid phenolic material to provide continuous cross bracing of the ceiling stiles. Finish to match stiles. Secure to each stile with at least 2 stainless steel shoulder screw and barrel nut sets. Brace shall be mounted on the stall side of the stiles.
- G. Shoes & Sleeves: 4-inches high minimum, Type 304 stainless steel with No. 4 satin brushed finish. Provide concealed retainer clips to attach to stile.
- H. Leveling Devices: 7 gauge, 3/16-inches thick, corrosion resistant, chromate-treated, double zinc-plated steel angle leveling bar bolted to stile; furnished with 3/8-inch diameter threaded rods, hex nuts, lock washers, flat washers, spacer sleeves, expansion anchors and shoe retainers.
- I. Mounting Brackets (Fittings): Continuous full-height angle or U-brackets; stainless steel or extruded aluminum; Continuous over full height of panels.
- J. Phenolic Core Finish: Manufacturer's standard impregnated. Allow for two colors in each room, one for stiles and panels and one color for doors.



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1. Color: As selected by Architect from manufacturer's extended range. Architect shall make selections from plastic laminate manufacturer's line of plastic laminates up to and including the intermediate price range colors and patterns.
2. Edge color: Black or brown.

**2.04 HARDWARE**

- A. Hardware: Manufacturer's standard heavy duty 18-8, Type 304 heavy-gauge stainless steel with satin finish, including corrosion-resistant, tamper-resistant fasteners:
1. Hinges: Toilet stall doors shall be hung with either:
    - a. Three surface mounted hinges made of 11 gauge type 304 stainless steel. Top hinge shall have concealed cams adjustable to 8 positions with stainless steel reinforcing pin; or
    - b. Continuous 16 gauge stainless steel piano hinge. Hinge shall be full height of door and secures with 14 fasteners; or
    - c. Two 8-inch wrap around hinges made of heavy-duty extruded anodized aluminum on a two cam system made of nylon with a stainless steel insert pin, adjustable in 5 positions.
  2. Latch and Keeper: Surface-mounted slide latch with flat rubber-faced combination door strike and keeper, with provision for emergency access, meeting requirements for accessibility at accessible compartments.
  3. Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall. Provide formed L-shaped hook without stop at outswing doors.
  4. Door Pull: Standard unit on outside of inswing doors. Provide pulls on both sides of outswing doors.

**2.05 PHENOLIC CORE BENCHES**

- A. Bench and Brace Construction: 3/4 inch thick.
- B. Supports: Stainless steel.
- C. Phenolic Core Finish: Manufacturer's standard impregnated.
1. Color: As selected by Architect from manufacturer's full line.
  2. Edge color: Black or Brown

**2.06 FABRICATION**

- A. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at stiles for connection to structural support above finished ceiling or exposed beams. Provide assemblies that support stiles from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of stiles to conceal anchorage.
- B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at stiles for structural connection to floor. Provide shoes at stiles to conceal anchorage.

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- C. Door Size and Swings: Unless otherwise indicated, provide 26-inch wide, in-swinging doors for standard toilet compartments and 36-inch wide, out-swinging doors with a minimum 32-inch wide clear opening for compartments designated as accessible.
- D. Benches: Fabricate as detailed. Provide manufacturer's standard corrosion-resistant anchoring assemblies.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

- A. Examine work area to verify that measurements, substrates, supports, and environmental conditions are in accordance with manufacturer's requirements to allow installation.
  - 1. Proceed with installation once conditions meet manufacturer's requirements.

**3.02 INSTALLATION**

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level and plumb. Secure units in position with manufacturer's recommended anchoring devices.
- B. Install toilet partitions and screens in spaces with operating, temperature controlled HVAC systems. Shield partitions and screens from direct sunlight.
- C. Clearances: Install with clearances indicated on Drawings. Where clearances are not indicated, allow maximum 1/2-inch between stiles and panels, and 1-inch between panels and walls.
- D. Continuous Brackets: Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at stiles with brackets at walls.

**3.03 ADJUSTING**

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

**3.04 FINAL CLEANING**

- A. Remove packaging and construction debris and legally dispose of off-site.
- B. Clean partition and screen surfaces with materials and cleaners in accordance with manufacturer's recommendations.

**END OF COMPARTMENTS AND CUBICLES**

**SECTION 10 28 00**

**TOILET, BATH AND LAUNDRY ACCESSORIES**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Toilet, Bath and Laundry Accessories as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Public-use shower and washroom accessories
    - b. Childcare accessories
    - c. Custodial accessories
- B. Related Work Specified Elsewhere:
  - 1. SECTION 06 10 00: Rough Carpentry
  - 2. SECTION 10 21 00: Compartments and Cubicles

**1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include the following:
  - 1. Construction details and dimensions.
  - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Material and finish descriptions.
  - 4. Features that will be included for Project.
  - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify locations using room designations indicated.
  - 2. Identify products using designations indicated.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Warranty: Sample of special warranty.

**1.04 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

**1.05 QUALITY ASSURANCE**

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- A. Manufacturer Qualifications: Manufacturer with minimum 5 years' experience in the manufacture of the product types specified. If requested submit a list of successful installations of similar products for evaluation by Architect.
- B. Accessibility Requirements: Comply with requirements of ADA/ABA and with requirements of authorities having jurisdiction.

**1.06 COORDINATION**

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

**1.07 WARRANTY**

- A. Manufacturer's Warranty for Washroom Accessories: Manufacturer's standard 1 year warranty for materials and workmanship.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products from Bobrick Washroom Equipment, Inc. which is located at: 6901 Tujunga Ave., North Hollywood, CA 91605-6213, or comparable products by Bradley Corp., or approved equal.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 MATERIALS**

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

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- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

**2.03 PUBLIC-USE WASHROOM ACCESSORIES**

- A. Toilet Tissue (Roll) Dispensers:

- 1. Surface-Mounted Twin Jumbo-Roll Toilet Tissue Dispensers: Bobrick ClassicSeries Model B-2892

- B. Paper Towel (Folded) Dispensers:

- 1. Surface-Mounted Paper Towel Dispensers: Bobrick ConturaSeries Model B-4262, furnished with Bobrick 369-130 TowelMate.

- C. Liquid-Soap Dispensers:

- 1. Surface-Mounted Soap Dispensers: Bobrick ConturaSeries Model B-4112

- D. Waste Receptacles:

- 1. Floor-Standing Waste Receptacles: Bobrick Model B-2280

- E. Grab Bars:

- 1. Stainless Steel Grab Bars (with snap flange covers): Bobrick Model B-6806
  - 2. Configuration and Length: As indicated on Drawings.

- F. Sanitary Napkin Vendors:

- 1. Surface Mounted Sanitary Napkin/Tampon Vendor: Bobrick ConturaSeries Model B-47069 50

- G. Sanitary Napkin Disposal Units:

- 1. Surface Mounted Sanitary Napkin Disposal units: Bobrick ConturaSeries B-270

- H. Mirrors:

- 1. Stainless Steel Channel Frame Mirrors: Bobrick Model B-165 2436 (24"X36")

**2.04 PUBLIC-USE SHOWER ROOM ACCESSORIES**

- A. Shower Curtain Rods:

- 1. Bobrick ClassicSeries Model B-6107

- B. Shower Curtains:

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- 1. Vinyl Shower Curtains and Hooks: Bobrick Model 204
- C. Soap Dishes:
  - 1. Solid Surface Soap Dish: Fabricated per Section 06 61 16 "Solid Surfacing Fabrications."
- D. Robe Hooks:
  - 1. Utility Hooks: Bobrick Model B-76717

**2.05 CHILDCARE ACCESSORIES**

- A. Diaper-Changing Stations:
  - 1. Surface-mounted Horizontal Design Baby Changing Stations: Model KB200 as manufactured by Koala Kare Products, a Division of Bobrick. Color as selected by Architect from manufacturer's full line.

**2.06 CUSTODIAL ACCESSORIES**

- A. Mop and Broom Holder:
  - 1. Bobrick Model B-223 x 24

**2.07 FABRICATION**

- A. Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

**PART 3 – EXECUTION**

**3.01 EXAMINATION**

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

**3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

**3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install supports attached to building structure for equipment requiring supports.
- C. Grab Bars: Install grab bars to withstand downward force of not less than 250 lbf per ASTM F 446.
- D. Install equipment level, plumb, and firmly in place in accordance with manufacturer's rough-in drawings.

**3.04 CLEANING AND PROTECTION**

- A. Protect installed products until completion of project.
- B. Clean unit surfaces, and leave in ready-to-use condition.
- C. Turn over keys, tools, maintenance instructions, and maintenance stock to Owner.
- D. Touch-up, repair or replace damaged products before Substantial Completion.

**3.05 TESTING AND ADJUSTING**

- A. Test each piece of equipment to assure proper operation, freedom of movement, and alignment. Install new batteries in battery-powered items.
- B. Repair or replace malfunctioning equipment, or equipment with parts that bind or are misaligned.

**END OF TOILET, BATH AND LAUNDRY ACCESSORIES**

**SECTION 22 00 00**

**PLUMBING**

**PART 1 – GENERAL**

**1.01 SUMMARY**

- A. This Section includes furnishing and installation of complete drainage, water supply, plumbing fixtures and other equipment as described herein and as indicated on the Drawings. It is the intent of contract documents to call for complete, finished work, fully tested and ready for continuous operation.
- B. Includes connections to site sewer and water lines. Before starting any work, coordinate locations and elevations of building services with the Site utilities. Discrepancies, if any, shall be corrected as soon as possible.
- C. Required water meters, backflow prevention devices and pits are to be provided by the contractor and coordinated with the authorities having jurisdiction as required.
- D. Coordinate voltages of all electrical devices with electrical contractor.
- E. Any apparatus, appliance, material or work not shown on the drawings by mention or reference in the specifications, or incidental accessories necessary to make the work complete and acceptable in all respects and ready for operation shall be furnished, delivered and installed under this section of the specifications without additional expense to the Owner.
- F. Drawings are generally diagrammatic and are intended to convey scope of work and indicated general arrangements of equipment, piping, fixtures, etc.

**1.02 SUBMITTALS**

- A. Submit product data for pipe, tube, fittings, equipment and couplings.
- B. Submit field quality control reports.
- C. Submit maintenance data for specialties and accessories to include in maintenance manuals.
- D. Valve Schedules: For each piping system. Reproduce on standard-size bond paper. Tabulate valve number, piping system, system abbreviation as shown on tag, room or space location of valve, and variations for identification. Mark valves intended for emergency shutoff and similar special uses. Besides mounted copies, furnish copies for maintenance manuals.

**1.03 QUALITY ASSURANCE**

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic, potable domestic water piping and components.



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- C. Comply with NSF 61, "Drinking Water System Components – Health Effects; Section 1 through 9," for potable domestic water piping and components.
- D. All materials, workmanship and equipment performance shall conform with the latest governing edition of the following standards, codes, specifications, requirements, and regulations:
  - 1. All applicable NFPA standards.
  - 2. State and local building codes and ordinances, and requirements of authorities having jurisdiction.
  - 3. American Society of Mechanical Engineers (ASME).
  - 4. American Society of Testing and Materials (ASTM).
  - 5. American National Standards Institute (ANSI).
  - 6. Underwriter's Laboratories, Inc. (UL).
- E. All work shall be performed by or under the direct supervision of a plumber licensed in the State of New Hampshire. All existing plumbing shall be brought into compliance with the N.H. State Plumbing Code.

**1.04 PROJECT CONDITIONS**

- A. Prior to submission of bids, trade contractors shall visit the site and/or review the related construction documents to determine the conditions under which the work is to be performed. Contractor shall report, in writing, to the Architect, any conditions which might adversely affect the contractor's ability to perform the Work.

**1.05 WARRANTY**

- A. The trade contractor shall submit manufacturer's warranties for products as specified in this section.
- B. All materials, types of equipment and workmanship furnished under this Section shall carry standard warranty against all defects in material and workmanship for a period of not less than one (1) year from date of Substantial Completion.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Basis of Design: Subject to compliance with requirements, provide products from one of the manufacturers specified in other Part 2 articles.

**2.02 GENERAL MATERIALS**

- A. Water Hammer Arrestors: Install appropriately sized water hammer arrestors at fast closing positive shutoff valves to prevent water hammer.
- B. Escutcheons: At all finished wall penetrations, provide chrome-plated, stamped steel, hinged, split-ring escutcheon with set screw. Inside diameter shall closely fit pipe outside diameter or

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outside of pipe insulation where pipe is insulated. Outside diameter shall completely cover the opening in floors, walls, or ceilings.

- C. Unions: Malleable-iron, Class 150 for low pressure and class 250 for high pressure service; hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends.
- D. Dielectric Unions: Provide dielectric unions with appropriate end connections for the pipe materials in which installed (screwed, soldered, or flanged), which effectively isolate dissimilar metals, to prevent galvanic action, and stop corrosion.
- E. Sleeves: Schedule 40 galvanized, welded steel pipe, ASTM A53, grade.
- F. Sleeve Seals: Modular type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
- G. Drip Pans: At water heater, provide drip pans fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up a minimum of 2-1/2 inches. Reinforce top, either by structural angles or by rolling top over 1/4-inch steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1-inch drain line connection.

**2.03 GENERAL-DUTY VALVES**

- A. General:
  - 1. Design: Rising stem or rising outside screw and yoke stems except as specified below.
    - a. Nonrising stem valves may be used only where headroom prevents full extension of rising stems.
  - 2. Pressure and Temperature Ratings: As required to suit system pressures and temperatures.
  - 3. Sizes: Same size as upstream pipe, unless otherwise indicated.
  - 4. Lever handles on all ball valves shall be color coded in conformance with ANSI Standard A13.1.
  - 5. Subject to compliance with requirements, provide products from NIBCO Inc., Milwaukee Valve Company, Inc., Crane Company, or approved equal.
- B. Gate Valves:
  - 1. Gate Valves, 2-1/2 Inches and Smaller: MSS SP-80; Class 125, 200-psi cold working pressure (CWP), or class 150, 300-psi CWP; ASTM B 62 cast-bronze body and bonnet, solid-bronze wedge, copper-silicone alloy rising stem, Teflon-impregnated packing with bronze packing nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.
- C. Ball Valves:

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1. Ball Valves, 4 inches and Smaller: MSS SP-110, Class 150, 600-psi CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2-inch valves and smaller and conventional port for 3/4-inch valves and larger; blowout proof; bronze or brass stem; Teflon seats and seals; threaded or soldered end connections:
  - a. Operator: Vinyl-covered steel lever handle.
  - b. Stem Extension: For valves installed in insulated piping.
  - c. Memory Stop: For operator handles.
- D. Check Valves:
  1. Swing Check Valves, 2-1/2 Inches and Smaller: MSS SP-80; Class 125, 200-psi CWP, or Class 150, 300-psi CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded or soldered end connections.
  2. Swing Check Valves, 3 inches and Larger: MSS SP-71, Class 125, 200-psi CWP, ASTM A 126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged or grooved end connections.
  3. Wafer Check Valves: Class 125, 200-psi CWP, ASTM A 126 cast-iron body, bronze disc/plates, stainless-steel pins and springs, Buna N seals, installed between flanges.
  4. Lift Check Valves: Class 125, ASTM B 62 bronze body and cap (main components), horizontal or vertical pattern, lift-type, bronze disc or Buna N rubber disc with stainless-steel holder threaded or soldered end connections.
- E. Drain Valves: Chrome plated, bronze body with interchangeable solid bronze wedge and screwed-in bonnet, with hose thread end, brass cap and chain, 200 psi.

**2.04 HANGERS AND SUPPORTS**

- A. Hangers for pipe up to and including 4-inches shall be swivel ring, split ring, wrought pipe clamp, band, or adjustable wrought clevis type. Hangers for pipes above 4-inches shall be standard clevis or roller.
- B. Saddles and Shields: Provide saddles and shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.

**2.05 VIBRATION AND SEISMIC CONTROLS**

- A. Vibration and seismic control devices, manufactured and approved for use, shall be provided as required and as suitable for use and service.
- B. Where seismic restraints are required, the Contractor shall provide calculations, details and locations that are stamped by a professional engineer.

**2.06 IDENTIFICATION**

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- A. Provide pipe markers, line markers, valve tags, valve schedule frames, and equipment markers complying with ANSI A13.1 for lettering size, length of color field, colors, and installed viewing angles of identification devices.
- B. Plastic Pipe Markers:
  - 1. Snap-On Type: Provide manufacturer's standard pre-printed, semi-rigid, snap-on, color-coded, pipe markers.
  - 2. Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers.
  - 3. Install every 40-feet and at each change in direction.
- C. Plastic Line Marker – Underground Type: Manufacturer's standard permanent burial, bright-colored, continuous-printed plastic type, intended for direct-burial service; not less than 6-inches wide and 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried tape.
- D. Plastic Valve Tags: Provide manufacturer's standard solid plastic valve tags with printed enamel lettering, with piping system abbreviation in approximately 3/16-inch high letters and sequenced valve numbers approximately 3/8-inch high, and with 5/32-inch hole for fastener.
- E. Valve Tag Fasteners: Manufacturer's standard solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.
- F. Valve Schedule Frames: For each page of the valve schedule. Provide a glazed display frame, with screws for removable mounting on walls. Provide frames of extruded aluminum or plastic with SSB-grade sheet glass or plastic.
- G. Plastic Equipment Markers: Provide manufacturer's standard laminated plastic, color coded equipment markers.

**2.07 PLUMBING INSULATION**

- A. All insulation shall be UL approved for a Flame Spread Rating of not more than 25 and a Smoke Developed Rating of not over 50.
- B. All insulation shall conform to requirements of the International Energy Conservation Code (IECC) currently adopted edition.
- C. Pipe insulation shall be fiberglass with ASJ and Zeston fittings or flexible elastomeric thermal insulation.
  - 1. Cold water shall be 1/2-inch.
  - 2. Hot water and hot water return shall be 1-inch.
  - 3. Roof drain bodies shall be 1-inch.
  - 4. Drain piping connected to roof drains shall be 1-inch.

**2.08 WATER PIPING**

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A. Underground Domestic Water Piping Within the Building:

1. Copper: Type "K" rolled copper with no fittings below slab.

B. Aboveground Domestic Water Piping:

1. PEX: Uponor ASTM F876/F877 SDR9 crosslinked polyethylene (PEX-a) piping with ASTM F1960 cold expansion fittings and PEX reinforcing rings installed per manufacturer's instructions.

**2.09 SANITARY WASTE AND VENT PIPING**

A. Underground Sanitary and Storm Pipe and Fittings:

1. Cast Iron: Hub and Spigot, Service Weight (SV) cast iron soil
2. PVC: Schedule 40 PVC with DWV fittings.

B. Aboveground Sanitary and Storm Pipe Fittings:

1. PVC: Schedule 40 PVC with DWV fittings.

C. Pressure Sanitary and Storm Pipe (Ejector or Sump Pumps):

1. Cast Iron: No Hub cast iron.
2. PVC: Schedule 40 PVC pressure pipe and fittings.

**2.10 PLUMBING FIXTURES**

A. Provide plumbing fixtures scheduled, at locations indicated on Drawings.

B. Provide required trim for each fixture including faucets, stops, drains, tail pieces, traps and escutcheons.

C. Exposed Pipe: Exposed flush, waste and supply pipes at fixtures shall be chromium plated brass pipe, iron pipe size.

D. Provide all wall hung fixtures with adjustable carriers and fittings with block feet anchor bolted to floor where required in schedules.

E. Vandalproofing: Provide vandalproof fittings for all fixtures located in areas accessible to the public.

F. Hot Water Circulating Pump: Stainless steel construction with capacity of 3 gpm at TDH of 15 ft. with 1/8 hp, single phase, 120 volt motor with magnetic motor starters with overload protection. Make: Bell & Gossett SSF-22 or Taco, Grundfos or approved equal.

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- G. Compression Tank: Diaphragm type, 100 psi WWP, ASME steel construction, pre-pressurized carbon steel and final exterior coat factory applied. Suitable for commercial potable water systems. Bell & Gossett "PTA-Series" or Taco or approved equal.
- H. Coin Operated Solenoid Valve: Industrial rated coin operated timer controller, NEMA 3R, scratch and corrosion resistant enclosure, 1/2-inch motor operated water solenoid valves, 120 volt, single phase, 24 volt control transformer.
  - 1. Basis of Design Product: Electronic Coin Operated Shower System III as manufactured by Fluid Manufacturing.
- I. Floor Cleanouts: Adjustable floor cleanout with Dura-Coated cast iron body, with watertight ABS tapered thread plug, and round scoriated top, adjustable to floor finish. Top shall be polished nickel bronze. Zurn "Z-1400" or approved equal.
- J. Dishwash Sinks: Commercial freestanding stainless steel fabricated basins, backsplash, drain boards, faucets, support legs, basket strainers and accessories as required for a full and complete working unit. Units to meet all accessibility standards and heights. As scheduled or approved equal.

**PART 3 – EXECUTION**

**3.01 GENERAL**

- A. Escutcheons: Install pipe escutcheons for pipe penetrations of wall, ceiling and floor construction.
- B. Sleeves:
  - 1. Install sleeves for passing through concrete and masonry walls, gypsum-board partitions, concrete floor and roof slabs, and where indicated.
    - a. Cut sleeves to length for mounting flush with both surfaces.
    - b. Install large enough sleeves to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
    - c. Except for below-grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants equal to neutral-curing silicone sealant, Type S, Grade NS, Class 25.
  - 2. Below Grade, Exterior Wall, Pipe Penetrations: Install cast-iron wall pipes for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installation of mechanical seals.

**3.02 GENERAL-DUTY VALVE INSTALLATION**

- A. Install valves as indicated, according to manufacturer's written instructions.
- B. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access and provide separate support where necessary.

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- D. Install valves in horizontal piping with stem at or above the center of the pipe.
- E. Install valves in a position to allow full stem movement.
- F. General Application: Use gate, ball, and butterfly valves for shutoff duty; globe, ball, and butterfly for throttling duty.

**3.03 HANGER AND SUPPORT INSTALLATION**

- A. General: Comply with MSS SP-69 and SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- C. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- D. All hanger materials shall be same material as the pipe or compatible (no dielectric reactions).
- E. There shall be no contact between stud walls or studs and piping, provide PVC spacers as required.

**3.04 IDENTIFICATION INSTALLATION**

- A. Install pipe markers on each system. Include arrows showing normal direction of flow.
- B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms and accessible maintenance spaces.
- C. Install valve tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in valve schedule.
- D. Valve Tag Application Schedule: Tag valves according to size, shape, color scheme, and with industry standard captions.

**3.05 INSULATION INSTALLATION**

- A. Tightly butt longitudinal seams and end joints. Bond with adhesive.
- B. Stagger joints on double layers of insulation.
- C. Apply insulation continuously over fittings, valves, and specialties, except as otherwise indicated.
- D. Apply insulation with minimum number of joints.

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- E. Apply insulation with integral jackets as follows:
1. Pull jacket tight and smooth.
  2. Double cover circumferential joints with butt strips, at least 4-inches wide, and of same materials as insulation jacket. Secure with adhesive and outward clinching staples along both edges of butt strip and space 4-inches on center.
  3. Longitudinal Seams: Overlap seams at least 1-1/2 inches. Apply insulation with longitudinal seam at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4-inches on center.
- F. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions. Apply an aluminum jacket with factory-applied moisture barrier over insulation. Extend 2 inches from both surfaces of wall or partition. Secure aluminum jacket with metal bands at both ends. Seal ends of jacket with vapor barrier coating. Seal around penetration with joint sealer.
- G. Floor Penetrations: Terminate insulation underside of floor assembly and at floor support at top of floor.
- H. Flanges, Fittings, and Valves – Interior Exposed and Concealed: Coat pipe insulation ends with vapor barrier coating. Apply premolded, precut, or field-fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.
- I. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts. For cold surface piping, extend insulation on anchor legs a minimum of 12 inches and taper and seal insulation ends.

**3.06 PIPING INSTALLATION**

- A. All water piping must be carefully pitched to facilitate complete seasonal drain-back of the water system. Drain valves shall be provided at low spots. Water piping shall be run parallel and graded evenly to the drainage points. There shall be a 1/2-inch boiler tap type drain valve provided for each low point in the piping, so that all parts of each water system can be readily drawn-off.
- B. Install components having pressure rating equal to or greater than system operating pressure.
- C. Install piping in concealed interior and exterior locations, except in equipment and service areas.
- D. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, except where indicated.
- E. Service Entrance Piping: Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each service entrance pipe.
- F. Water Meters: Rough-in water piping for water meter installation according to utility company's requirements or Division of Parks Standards. Water meter will be furnished by utility, or if no utility, by the Contractor as part of this Work.



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- G. Connect water distribution piping to service entrance piping at shutoff valve, and extend to and connect to the following:
1. Water Heaters: Connect cold-water supply and hot-water outlet piping in sizes required but not smaller than sizes of water heater connections.
  2. Plumbing Fixtures: Connect Hot- and cold-water supply piping in sizes required, but not smaller than required by plumbing code.
  3. Equipment: Connect hot- and cold-water supply piping as required. Provide shutoff valve and union for each connection.
- H. Valve Installation:
1. Sectional Valves: Install sectional valves close to main on each branch and riser serving plumbing fixtures or equipment, and where indicated. Use only ball valves for piping 2-inch NPS and smaller. Provide valves to isolate each bathroom and shower.
  2. Shutoff Valves: Install shutoff valve on each water supply to equipment, on each supply to plumbing fixtures without supply stops, and where indicated. Provide shut-off valves for each individual plumbing fixture. Use only ball valves for piping 2-inch NPS and smaller.
  3. Drain Valves: Install drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
    - a. Install hose-end drain valves at low points in water mains, risers, and branches.

**3.07 WASTE AND VENT PIPING INSTALLATION**

- A. Extend building sanitary drain piping and connect to sanitary sewer piping in sizes and locations indicated for service entrances into building. Install cleanout and extension to grade at connections of building sanitary drains with building sanitary sewers.
- B. Make changes in direction for drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees for short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used in vent lines. Do not make change in direction of flow greater than 90 degrees. Use proper size of standard increasers and reducers if different sizes of piping are connected. Reducing size of drainage piping in direction of flow is prohibited.
- C. Lay buried building drain piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- D. Install drainage and vent piping at the following minimum slopes, unless otherwise indicated:
1. Sanitary Building Drain: 2 percent downward in direction of flow for piping 3-inch NPS and smaller; 1 percent downward in direction of flow for piping 4-inch NPS and larger.
  2. Horizontal, Sanitary Drainage Piping: 2 percent downward in direction of flow.
  3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stacks.

- E. Connect service entrance piping to exterior sewerage and drainage piping. Use transition fitting to join dissimilar materials.
- F. Connect drainage piping to service entrance piping, and extend to and connect to the following:
  - 1. Plumbing Fixtures: Connect drainage piping in sizes required, but not smaller than required by plumbing code.
  - 2. Plumbing Specialties: Connect drainage and vent piping in sizes required, but not smaller than required by plumbing code.
  - 3. Equipment: Connect drainage piping as require. Provide shutoff valve and union for each connection. Use flanges instead of unions for connections 2-1/2 inch NPS and larger.

### **3.08 FIXTURE INSTALLATION**

- A. Install fixtures level and plumb according to manufacturers' written instructions, roughing-in drawings, and referenced standards.
- B. Secure supplies to supports or substrate within pipe space behind fixture.
- C. Install individual stop valve in each water supply to fixture. Use gate or globe valve where specific stop valve is not specified.
- D. Install water-supply stop valves in accessible locations.
- E. Seal joints between fixtures and walls, floors, and counters using sanitary-type, 1-part, mildew-resistant, silicone sealant according to sealing requirements in Section 07 92 00 "Joint Sealants". Match sealant color to fixture color. Seal in accordance to the requirements of the International Plumbing Code.

### **3.09 TESTING**

- A. Test service entrance piping and water distribution piping as follows:
  - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
  - 2. Leave uncovered and unconcealed new, altered, extended, or replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
  - 3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
  - 4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
  - 5. Prepare reports for tests and required corrective action.

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- B. Test drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
  2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
  3. Roughing-In Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10 feet of head. Water level must not drop from 15 minutes before inspection starts through completion of inspection. Inspect joints for leaks.
  4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
  5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
  6. Prepare reports for tests and required corrective action.

**3.10 CLEANING AND DISINFECTION**

- A. Clean and disinfect potable service entrance piping and water distribution piping as follows:
1. Use purging and disinfecting procedure prescribed by the National Standard Plumbing Code or as directed by the Water Department, whichever is the more stringent, or procedure described in either AWWA C651 or AWWA C652 or as described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Fill and isolate system according to either of the following:
      - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and let stand for 24 hours.
      - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for 3 hours.
    - c. Flush system with clean, potable water until chlorine is no longer in water coming from system after the standing time.
    - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows contamination.
  2. Prepare and submit reports for purging and disinfecting activities.
  3. Clean interior of piping system. Remove dirt and debris as work progresses.

**END OF PLUMBING**

**SECTION 23 00 00**

**HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Heating, Ventilating and Air Conditioning as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job. The Work shall consist of furnishing and installation of a complete operational hot air heating and ventilation system including miscellaneous items. The HVAC Contractor shall provide all design build services as required to properly size all equipment and accessories for a complete system.
1. The Work shall include, but shall not necessarily be limited to:
- a. Ducted air distribution systems
  - b. Duct insulation
  - c. Louvers, grilles and diffusers
  - d. Dampers
  - e. Exhaust fans
  - f. Air balancing
- B. Related Work Specified Elsewhere:
1. SECTION 26 00 00: Electrical

**1.02 ACTION SUBMITTALS**

- A. Product Data: For all products, equipment and materials.
- B. Close-Out Submittals: Contractor shall furnish binder copies of an operation and maintenance manual for the mechanical systems, indexed, including but not limited to the following information:
- 1. Starting and stopping procedure.
  - 2. Special operating instructions.
  - 3. Routine maintenance procedures.
  - 4. Schedule of periodic servicing and lubrication.
  - 5. Manufacturer's printed operating and maintenance instructions, parts list, illustrations and diagrams.
  - 6. One copy of each wiring diagram.
  - 7. One approved copy of each shop drawing and Contractors layout drawings.

**1.03 QUALITY ASSURANCE**

- A. Manufacturers Qualifications: Manufacturers with a minimum of five years' experience manufacturing products in this Section shall provide all products listed.

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- B. Installer Qualifications: Products listed in this Section shall be installed by a single organization with at least five years' experience successfully installing specified products on projects of similar type and scope as specified in this Section.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Deliver materials to the job site in undamaged condition, in original factory sealed containers, clearly labeled with manufacturer's name and product identification.
- C. Materials shall be stored in a protected and safe area as designated by the General Contractor.

**1.05 WARRANTY**

- A. Provide manufacturer's warranties:
1. The Contractor shall obtain in the Owner's name, the standard written manufacturer's warranties for all materials furnished under this Section where such warranties are offered in the manufacturer's published product data.
  2. The Contractor shall furnish a warranty for all work performed by him for a period not less than one (1) year from the date of Substantial Completion.
  3. All warranties shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

**1.06 INSERTS AND OPENINGS**

- A. The layout for such items as chases, openings, sleeves and inserts shall be arranged in advance of construction of the work, and shall be directed and superintended to see that same is carried out without unnecessary cutting of the building. Any damage that may be done to the building by the Contractor's failure to provide the necessary information for required chases, sleeves and openings in advance, shall be repaired and corrected prior to the Owner's acceptance of the building.
- B. All sleeves and inserts required for passage and support of piping and ductwork shall be furnished and installed by the Contractor as walls and floors are constructed.

**1.07 CODES, STANDARDS AND PERMITS**

- A. The work shall comply with requirements of all State and Local codes which apply, and nothing in the Specification shall be interpreted as any infringement of such codes. The following shall apply to the work under this Section:
1. American National Standard Institute Inc. (ANSI)
  2. U.S. Department of Commerce, National Bureau of Standards (NBS)
  3. American Society of Testing and Materials (ASTM)
  4. American Society of Mechanical Engineers (ASME)
  5. Underwriters Laboratories Inc. (UL)

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6. National Fire Protection Association (NFPA)
  7. Plumbing and Drainage Institute (PDI)
  8. National Electric Manufacturers Association (NEMA)
  9. International Mechanical Code (IMC)
  10. Life Safety Code (NFPA 101)
  11. American Society of Heating, Refrigeration, Air Conditioning Engineers (ASHRAE)
- B. Where materials or equipment are specified to conform to requirements of the listed standards, the Contractor shall submit proof of such conformance. The label or listing of the specified agency will be acceptable evidence.

**PART 2 – PRODUCTS**

**2.01 MANUFACTURERS**

- A. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 DUCTWORK**

- A. Sheet metal ductwork shall be galvanized steel, smooth inside and true to size. Duct construction, gauges, specifications and supports shall be in accordance with recommendations of the current edition of SMACNA Duct Construction Standards. No standards for ductwork other than SMACNA shall be accepted. All ductwork shall be 1-inch water gauge pressure class.
- B. All joints and seams of all ductwork shall be sealed with UL labeled sealer as manufactured by 3M Company or United Sheet Metal.
- C. Sheet metal elbows shall have a radius of 1 1/2 times the duct width measured by duct centerlines. Where conditions will not permit or where indicated on drawings use miter turns with double wall turning vanes.
- D. Provide air splitter dampers where indicated on Drawings and where required for adjustment of air distribution to respective duct branches. Splitter damper shall be constructed in accordance with applicable SMACNA Standards.
- E. Provide factory fabricated volume dampers in all supply, return and exhaust branch ducts and where indicated on Drawings. Volume dampers shall be constructed in accordance with applicable SMACNA Standards.
- F. After and during assembly of ducts, clean all dirt, grease, rubbish, etc. from both the interior and exterior of ductwork.
- G. After installation, ductwork shall be tested. Where specified compound is used to seal seams, ductwork shall not be subject to air pressure for a period as recommended by the manufacturer but at least 48 hours after assembly.
- H. Where ducts are insulated, provision shall be made for a neat installation of finish around damper operation quadrant, test slots, test openings, access doors and similar operation devices.

**2.03 EXHAUST FAN**

- A. Steel In-Line Fans: Straight airflow nonoverloading, steel centrifugal wheel with backward curved fan, statically and dynamically factory balanced, heavy gauge steel housing, reinforced, prime coated, internal 1/2-inch thick mat faced glass fiberboard acoustical material, access panel, companion flanges and support brackets, direct drive motor with variable speed drive. As scheduled or approved equal.

**2.04 GRILLES AND DIFFUSERS**

- A. Grilles and diffusers shall be aluminum construction with horizontal front bars on 3/4-inch spacing and set at 45 degrees. White finish. Key operated opposed blade damper. 1-1/4 inch wide flange with sponge rubber gasket. Titus "3-FL" or Anemostat, Carnes, Krueger, Metalaire, Price or approved equal.

**2.05 FILTERS**

- A. Provide one set of new air filters in warm air furnace when construction is completed and building is ready for final inspection. Provide two sets of replacement air filters to be turned over to the State Park Maintenance Supervisor.

**2.06 INSULATION**

- A. All supply ductwork shall be insulated with 3-inch foil faced fiberglass insulation, all intake and exhaust ductwork shall be insulated with 1-1/2 inch foil faced fiberglass insulation. All insulation shall be stapled and taped.

**2.07 ACCESS DOORS**

- A. Provide where necessary in ductwork or casings, suitable access doors and frames to permit inspection, operation and maintenance of all valves, controls, fire dampers, filters, bearings, or other apparatus concealed behind the sheet metal work. All such doors in insulated ducts to be double panel insulated of not less than 20-gauge. Access doors in un-insulated ducts may be of single panel construction of not less than 18-gauge galvanized steel, and shall have sponge rubber gaskets around their entire perimeter.

**2.08 LOUVERS**

- A. Factory constructed aluminum louvers. 4-inch deep stormproof blades. Mullions where blade length exceeds 60-inches with 1/2-inch mesh, 14 gauge wire, aluminum birdscreen secured in removable frame, secured to back of louver, extruded sections 6063-T5 alloy, 0.8-inch minimum thickness, 4-inch deep unless otherwise called for. One piece structural head. Sill extension and sill style as required. Stainless steel fasteners. Anodized finish color as selected by Architect. As manufactured by Construction Specialties, Airolite or approved equal.

**2.09 VIBRATION ISOLATION**

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- A. Unless otherwise noted, all rotating mechanical equipment shall be mounted and/or hung on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. All duct connections to equipment shall be made with canvas connections.

**2.10 MOTORS**

- A. Single phase, 60 Hz, in compliance with NEMA, Class B temperature rise, 1.15 Minimum service factor, 20,000 hour bearings. Premium efficiency type IEEE Standard 112 Method B. Motors for general purposes shall be open-drip-proof, dusty or open to weather shall be TEFC. As manufactured by General Electric, Gould, Reliance, Westinghouse or approved equal.

**PART 3 – EXECUTION**

**3.01 INSTALLATION**

- A. The HVAC systems and all associated work shall be furnished and installed in accordance with all specified codes for the service intended.
- B. It is the intent of the Specifications and Drawings that the systems shall be furnished and installed complete.
- C. The HVAC Contractor shall furnish and install all piping, ductwork, insulation, valves, equipment, devices and controls needed and usually furnished in connection with such work whether specifically mentioned or not.
- D. The work shall be carried on under the usual conditions affecting the construction of the type involved, in conjunction with other operators at the site. The HVAC Contractor shall cooperate with the Architect and all Contractors working on the site. He shall coordinate his work with theirs and shall proceed in such manner as not to delay or hinder in any way the progress of the work as a whole. In case of dispute, the Architect shall render a decision which shall be final.
- E. The HVAC Contractor shall secure instructions from the General Contractor as to space for storing materials and tools and shall remove all debris, unused materials and equipment from the premises as promptly as possible.
- F. Piping and ductwork shall be concealed within finished walls and ceilings and under floors and shall be kept 6-inches away from parallel runs of electric wiring. Piping, ductwork and equipment shall be supported and secured at proper intervals. Exposed piping shall have runs installed parallel or perpendicular to walls or structural members. Crushed or deformed piping and ductwork shall not be installed.
- G. Care shall be taken to prevent lodgement of plaster, dirt, or trash in piping, ductwork, valve fittings and equipment during the course of construction. Clogged equipment and/or material shall be entirely freed of constriction or shall be replaced.
- H. Piping shall be secured by pipe straps or shall be supported by wall brackets, strap hangers, or ceiling trapeze, fastened by wood screws on wood, expansion bolts on concrete or brick and machine screws or welded threaded studs on steel work.



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- I. Flexible connections of short length shall be provided for motors and equipment subject to vibrations or movement.
- J. Access panels, if required for mechanical work, shall be furnished by the HVAC Contractor for installation by the applicable trade.
- K. The HVAC Contractor shall consult all Contract Drawings which may affect the location of any outlets, apparatus and equipment to avoid all possible interference and permit full coordination with all work. The right to make any reasonable change in location to outlets, apparatus or equipment up to the time of roughing-in, is reserved by the Architect, and such changes shall be made without additional cost to the Owner.
- L. It shall be the responsibility of the HVAC Contractor to see that all mechanical equipment is made accessible. Valves, controls, and such other apparatus as may require maintenance and operation from time to time shall be positioned to facilitate servicing.

**3.02 WORKMANSHIP**

- A. All work shall be executed in a workmanlike manner and shall present a neat and mechanical appearance.
- B. All ducts and pipes shall be run parallel or perpendicular to building grid lines, and shall be properly graded.
- C. All pipe connections shall be made in a manner which will allow for freedom of movement during expansion and contraction.
- D. Swing joints, expansion loops and expansion joints with proper anchors required to provide flexibility shall be provided as if they were shown, at no additional cost to the Owner.

**3.03 PROTECTION**

- A. The HVAC Contractor shall take particular care to protect any finished work from damage caused thereto by his operations or the operations of any other Contractors.
- B. The HVAC Contractor shall provide suitable protection of all equipment furnished under this Contract while stored at the job site and after installation. This protection shall be suitable to guard equipment items against damage from the weather or from construction activity. Such protection shall not be removed until directed by the Architect. The interior and exterior of all ducts, piping and equipment shall be kept in a clean condition, free from dirt and debris. All piping, duct, and equipment items shall be thoroughly cleaned before start-up of any equipment or system.

**3.04 CONTROLS, ADJUSTING AND BALANCING**

- A. Provide a complete automatic control system.
  - 1. Provide wiring and conduit as required to connect devices furnished as part of or adjunctive to this automatic control system regardless of supply. Power and control

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circuits, 120 volt maximum, to electrical panels. Install wiring in accordance with Division 26 "Electrical" and National Electric Code.

2. Provide wiring, conduit and devices required for proper system operation, including special electrical switches, transformers, disconnect switches, relays, circuit breaker protection, and other devices as required.

**B. Exhaust Fans**

1. Fan shall operate whenever the light switch is activated and shall remain operating for 30-minutes after the light switch is turned off. Delay shall be provided by the use of a Timing Relay.

**C. Adjusting and Balancing:** Balancing report shall be typed and submitted for review, results shall be guaranteed. Contractor shall be subject to recall to site to verify report information before acceptance of the report by the Owner's representative.

1. Balancing Contractor shall follow the procedures of the Associated Air Balance Council (AABC) or the National Environmental Balancing Bureau (NEBB).
2. Place systems in satisfactory operating condition. Adjusting and balancing shall be accomplished as soon as systems are complete and before Owner takes possession. Change pulleys as required to meet system performance requirements. Perform necessary mechanical adjustments in conjunction with balancing procedure. Replace dampers in systems that cannot be manipulated to satisfy balancing requirements.
3. Air Systems: Test and adjust fan rpm to design requirements. Test and record motor no load and full load amperes, and determine operating brake horsepower. Test and record system static pressures, suction and discharge. Test and adjust zones and system for design exhaust air CFM. Test and adjust system for design outside air CFM.

**END OF HEATING, VENTILATING AND AIR CONDITIONING (HVAC)**

**SECTION 26 00 00**

**ELECTRICAL**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Electrical systems as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job. The Electrical Contractor shall provide all design build services as required to properly size all equipment and accessories for a complete system in accordance with the latest version of the State Electrical Code.
1. The Work shall include, but shall not necessarily be limited to:
- a. Electrical service entrance
  - b. Electrical service
  - c. Panelboards
  - d. Conductors and grounds
  - e. Wiring devices and plates
- B. Related Work Specified Elsewhere:
1. SECTION 23 00 00: Heating, Ventilating and Air Conditioning
- C. The information shown on the Drawings is diagrammatic only and indicates the general arrangement of systems and equipment. Basic design concepts must be followed or bettered. The Contractor shall be responsible for coordinating and designing a complete and functional system.
- D. Coordinate utility service work with local utility companies, general contractor, building conditions and site conditions prior to installation. Provide advance coordination as required for timely connections of temporary and permanent services. Contact utility companies prior to submission of bid. Include all utility fees and costs related to this project in bid.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For all products, equipment and materials.

**1.03 QUALITY ASSURANCE**

- A. All material and equipment shall bear a certification of a national certifying organization such as Underwriters Laboratory or Factory Mutual and be installed according to the National Electric Code, local rules and regulations and all other codes and standards listed elsewhere in these Specifications or on the Drawings.
- B. Execute work in a neat and workmanlike manner in conformance with best modern trade practice, (i.e. IEEE, NEC, ANSI, NFPA, NEMA) by competent, experienced, licensed electricians,

presenting a neat appearance when completed. Replace work not approved by Owner's representative without additional charge.

**1.04 DELIVERY, STORAGE AND HANDLING**

- A. All materials and related accessories shall be delivered and stored in strict compliance with the manufacturer's instructions.
- B. Materials shall be delivered to the site in the original sealed containers or packages bearing the manufacturer's name and brand designation. All materials shall be stored in a clean, well-ventilated, warm area. Care shall be exercised in handling materials during delivery, storage and installation.

**1.05 WARRANTY**

- A. The Contractor shall warranty all materials and installations under normal use to be free from defects and poor workmanship for a period of one (1) year from the date of Substantial Completion. Any replacement of parts or adjustments, including labor made necessary by inherent defects, shall be provided by the Contractor without cost to the Owner within the warranty period.

**1.06 CODES AND STANDARDS**

- A. The complete installation shall be in compliance with the New Hampshire State Building Code, NFPA and other applicable rules and regulations prescribed by the authority having jurisdiction.

**PART 2 – PRODUCTS**

**2.01 MATERIALS, GENERAL**

- A. Unless otherwise indicated, the materials to be furnished under this Section shall be the standard products of manufacturer's regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design that complies with the Specification requirements.
- B. Source Limitation: Obtain products from a single source from a single manufacturer.

**2.02 EQUIPMENT MOUNTING AND SUPPORTS**

- A. Provide all supports including supplementary steel, channels, chains, rods and guys required for the proper installation, mounting and support of all equipment.
- B. Supports shall be firmly attached to building structural elements and constructed in an approved manner. Continuously threaded rods less than 3/8-inch in diameter, tie wire, or metal straps are not approved.
- C. Except as otherwise required by the Contract Documents the type and size of supports shall be as determined by the Contractor and shall be of sufficient strength and size to allow only a minimum deflection as required by codes or standards and support the manufacturer's requirements for loading.

- D. Inform all parties as to the location, size, details and method of attachment of supports and the weight which support is to carry, so that the installation may be coordinated.
- E. Supports shall be installed in a neat and workmanlike manner, perpendicular or parallel to walls, floor, columns, beams or ceiling.

### **2.03 GROUNDING**

- A. Furnish and install grounding systems conforming to IEEE std. 142-1982 and 241. Comply with requirements of NEC, Article 250 pertaining to electrical grounding system. Comply with applicable requirements of U.L. Standards numbers 467 and 869 pertaining to electrical grounding and bonding. Provide grounding products which are U.L. listed and labeled.
- B. Provide electrical grounding systems required including but not limited to cables, wires, connectors, terminals (solderless lugs), grounding rods/electrodes, plate electrodes, bonding jumper braid, surge arrestors, and additional accessories needed for complete installation.
- C. Provide electrical bonding plates, connectors, terminals, lugs, and clamps as recommended by manufacturer for required applications.
- D. Ground rods shall be solid copper 5/8-inch diameter and 10-feet long.
- E. Upon completion of installation of electrical grounding systems, test ground resistance. Where tests show resistance to ground is over 3 ohms take appropriate action to reduce resistance to 3 ohms or less by driving additional ground rods and/or by chemically treating soil encircling ground rod. Then retest to demonstrate compliance.
- F. All feeder, subfeeders, lighting branch circuits and all receptacle circuits shall contain a grounding conductor minimum No. 12 copper with green insulation.
- G. Grounding terminal on receptacles shall be bonded to outlet box with grounding conductor to establish grounding continuity.
- H. Flexible conduit and electric metallic tubing feeder raceways shall include grounding conductor.
- I. Grounding conductors shall be stranded copper wire with THHN green insulation.
- J. Grounding bushings shall be provided for all raceways.

### **2.04 PANELBOARDS**

- A. Panelboard cabinets shall be of the dead-front or safety type, provided with the size and number of single, double or triple pole branches required. Cabinets shall be constructed of zinc coated steel and shall conform to Underwriters Laboratories, Inc. Standard for Cabinets and Boxes. Cabinet height shall not exceed 72-inches and shall be mounted so that the distance from the floor to center of the top circuit breaker will not exceed 72-inches. Cabinets shall be provided with trims having adjustable trim clamps. Trims shall be fitted with hinged doors. A directory shall be mounted in each frame.

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- B. Panelboards shall be surface mounted with branch circuit breakers and main breaker as required.
- C. Panel with main breaker shall be Cutler Hammer, "BR Load Center" or approved equal. Panel shall accommodate a single phase, 200 amp service and have space for minimum 40 circuits.
- D. All branch circuit breakers installed in the panels shall have a minimum short circuit rating as indicated on the panel diagram. Provide factory-assembled molded case circuit breakers of frame size required. Provide breakers with permanent thermal and instantaneous magnetic trips in each pole and with 10,000 AIC minimum fault current limiting protection and ampere rating as required. Construct with over center, trip free, toggle type operating mechanisms with quick make, quick break actions and positive handle trip indication. Provide breaker with mechanical screw type removable connector lugs, AL/CU rated.
- E. At indicated circuits provide circuit breaker with integral ground fault interrupter with 5 milliamperes ground fault trip level.

**2.05 WIRING IN CONDUIT**

- A. Type MC (metal clad cable) shall be used for branch circuits including power, lighting and control per NEC.
- B. Electrical metallic tubing (EMT) shall be used for all feeders and empty conduit systems. EMT may be used for branch circuits including power, lighting and control per NEC. EMT shall not be used where subject to water or moisture conditions. Threadless couplings and connectors used with EMT shall be made up tight. Minimum size of conduit to be 3/4-inch.
- C. Connections to portable equipment from junction boxes and conduit termination to motors shall be made with liquid-tight flexible metal conduit, finished black or grey to match equipment. Flexible connections shall be maximum of 18-inches long with grounding conductor.
- D. Under slab wiring shall be installed in schedule 40 rigid PVC conduit. Comply with NEMA Standards. Under slab conduit shall be 3-inch diameter.

**2.06 CONDUCTORS**

- A. All conductors installed in raceway shall be insulated, type THW or THWN, 600 volt service, within building and for secondaries. All such wiring shall be color coded. Conductors with higher insulation temperature ratings shall be provided as required.
- B. Conductor and conduit sizes shown on the drawings are based on copper conductors with THW insulation, unless otherwise noted.
- C. Joints and splices shall be made in a manner equivalent electrically and mechanically to the conductor itself. Connections shall be of the compression type.
- D. Where receptacles or convenience outlets are specified to serve equipment, furnish, install and connect approved flexible cable and cap to equipment.

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- E. Make all final connections, flexible or fixed as required to all equipment shown requiring final electrical connections.
- F. Wire, conductors and cable shall be as manufactured by General Electric Company, Rome Cable, General Cable Corporation or approved equal.

**2.07 WIRING DEVICES**

- A. Switches, receptacles and other utilization devices shall be as manufacture by Leviton, General Electric, Hubbell or approved equal. Symbols and nomenclature is that of Leviton. Switches shall have a minimum rating of 20 amperes.
- B. All receptacles and switches shall have a grounding pole and grounding terminal, which shall be connected to the outlet box with grounding conductor to establish grounding continuity.
- C. Verify mounting height of all devices prior to roughing.
- D. Provide heavy-duty duplex receptacles, 2 pole, 3 wire grounding, 20 amperes, 125 volts, with metal plaster ears, back and side wiring, NEMA configuration 5-20R.
- E. Provide device plates for all devices, switches, and receptacles and miscellaneous outlets. Plates shall be stainless steel with ganging and cut-outs appropriate to the indicated circuiting.

**2.08 PULL BOXES AND JUNCTION BOXES**

- A. Pull boxes and junction boxes shall be of code gauge galvanized steel with screw covers to match, shall be as required and shall be as shown on the Drawings.
- B. Conductors passing through pull boxes shall be identified to indicate their origin and termination.
- C. Pull and junction boxes and covers shall be for indoor use, except provide other types as required because of location.
- D. Covers shall not be installed until installation has been observed. Provide nameplate on cover.

**2.09 NAMEPLATES**

- A. Provide nameplates for panelboards, switch panels, relays, empty raceways, contactors, pull boxes, junction boxes, motor disconnect switches, and remote switches designating equipment controlled and function.

**2.10 OUTLETS**

- A. Outlets shall be centered in panels and spaces provided therefore.
- B. Where outlets of any system occur provide suitable boxes and conduit so that they may be built in as the work progresses. Box offsets shall be made at all outlets to provide proper adjustment to structural finish.

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- C. Receptacle outlet boxes shall have factory installed grounding conductor which shall be connected to receptacle grounding terminal.
- D. Fixture outlet boxes shall have 3/8-inch solid male fixture studs.
- E. Raised covers in open frame construction where no other finish is to be applied, shall have 90 degree corners and edges. Boxes in wall panel finish shall have raised stainless steel covers with rounded edges and corners.
- F. Exposed outlet boxes shall have threaded conduit hubs.

**2.11 LIGHTING FIXTURES AND LAMPS**

- A. Fixtures shall be complete with all accessories such as close nipples, extension couplings, connecting straps, screws, locknuts, hickies and plaster rings, to provide complete fixture installation for use with any type of standard outlet or switch box. Special fittings required to support fixtures shall be supplied.
- B. Fixture Schedule: As indicated on Drawings.

**2.12 TERMINAL STRIPS**

- A. All terminal strips for electrical wiring shall be mounted on a separate 3/8-inch select grade backboard within cabinets or boxes. All terminal strips shall be rated for the ampacity of the wire intended to be connected, but in no case less than twenty amps. All terminal strips shall be identified and each wire at every terminal shall be identified by means of a Brady wire tag.

**2.13 SAFETY SWITCHES**

- A. Safety switches shall be heavy duty, with ampere rating number of poles, fusible or non-fusible as indicated or required. Manufacturer shall be ITE, G.E., Sylvania, Square D or Westinghouse.

**PART 3 – EXECUTION**

**3.01 RACEWAYS AND CONDUIT**

- A. Raceways shall be supported and secured at intervals of not more than 10 feet, with minimum of two supports. Tie wire or perforated metal straps shall not be used to support or secure raceways or other equipment. Electric metallic tubing shall be supported within 18-inches of each coupling or connector. In finished areas, furnish and install escutcheons for all exposed conduit passing through or entering finished floors or walls.
- B. Raceways shall have runs installed parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings. Field-made bends and offsets shall be avoided where possible, but where necessary, shall be made within an approved hickey or conduit bending machine. Crushed or deformed raceways shall not be installed. Trapped raceways shall be avoided. Care shall be taken to prevent the lodgement of plaster, dirt or trash in raceway boxes, fittings and equipment during the course of construction. Clogged raceways shall be entirely free of obstructions or shall be replaced. Wooden plugs inserted in concrete or masonry



are not acceptable as a base for raceway fastenings nor shall raceways or pipe straps be welded to steel structures. Raceways shall be secured by pipe straps or shall be supported by wall brackets, strap hangers or ceiling trapeze fastened by wood screws on wood, toggle bolts on hollow units, expansion bolts on concrete or brick and machine screws or welded studs on steel work.

### **3.02 OUTLETS**

- A. Each outlet in the wiring or raceway systems shall be provided with an outlet box to suit the conditions encountered. Each box shall have sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of the National Electric Code. Boxes shall not be less than 1-1/2 inches deep unless shallower boxes are required by structural conditions and are specifically approved.
- B. Ceiling and bracket outlet boxes shall be not less than 4-inches except smaller boxes may be used where required by the particular fixture to be installed. Boxes shall be installed in a rigid and satisfactory manner and shall be fastened directly with wood screws on wood; bolts and expansion shield on concrete or brick; toggle bolts on hollow masonry units and machine screws or welded threaded studs on steel work. Threaded studs driven in by a powder charge and provided with lock washers and nuts are acceptable in lieu of wood screws, expansion shields or machine screws if permitted by local authorities.

### **3.03 FIXTURES**

- A. All fixtures shall be supported by building structural elements independent of furred or suspended ceilings.
- B. The minimum number of supports for surface mounted or suspended fixtures shall equal one for each 48-inches of length plus one additional support. Additional supports shall be provided if required.

**END OF ELECTRICAL**

**SECTION 31 10 00**

**SITE CLEARING**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Site Clearing as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
  - 1. The Work shall include, but shall not necessarily be limited to:
    - a. Protecting existing vegetation to remain.
    - b. Removing existing vegetation.
    - c. Clearing and grubbing.
    - d. Stripping and stockpiling topsoil.
    - e. Temporary erosion and sedimentation-control measures.

**1.02 DEFINITIONS**

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2-inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

**1.03 MATERIAL OWNERSHIP**

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from project site.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - 1. Use sufficiently detailed photographs or videotape.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

**1.05 QUALITY ASSURANCE**

- A. Pre-installation Conference: Conduct conference at Project site.

**1.06 PROJECT CONDITIONS**

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify Dig Safe System for area where Project is located before site clearing.
- C. Do not commence site clearing operations until temporary erosion and sedimentation-control measures are in place.
- D. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- E. Do not direct vehicle or equipment exhaust towards protection zones.
- F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- G. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

## **PART 2 – PRODUCTS**

### **2.01 MATERIALS**

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving."
  - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## **PART 3 – EXECUTION**

### **3.01 PREPARATION**

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54-inches above the ground.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### **3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- A. Provide temporary erosion and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.03 TREE AND PLANT PROTECTION**

- A. General: Protect trees and plants remaining on-site.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

### **3.04 EXISTING UTILITIES**

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- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
  - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
  - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.
- E. Removal of underground utilities is included in earthwork sections and with applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security and utilities sections.

**3.05 CLEARING AND GRUBBING**

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Remove stumps.
  - 3. Use only hand methods for grubbing within protection zones.
  - 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8-inches, and compact each layer to a density equal to adjacent original ground.

**3.06 TOPSOIL STRIPPING**

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6-inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 2-inches in diameter; trash, debris, weeds, roots, and other waste materials.

- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
  - 1. Limit height of topsoil stockpiles to 72-inches.
  - 2. Do not stockpile topsoil within protection zone.
  - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled and reused.
  - 4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

**3.07 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

**END OF SITE CLEARING**

**SECTION 31 20 00**

**EARTH MOVING**

**PART 1 – GENERAL**

**1.01 DESCRIPTION**

- A. Provide all labor, materials, equipment, services, etc. required to furnish and install all Earth Moving as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.
1. The Work shall include, but shall not necessarily be limited to:
- a. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses and plants.
  - b. Excavating and backfilling for buildings and structures.
  - c. Subbase course for walks and pavements.
  - d. Subsurface drainage backfill for walls and trenches.
  - e. Excavating and backfilling trenches for utilities and pits for buried utility structures.
- B. Related Work Specified Elsewhere:
- 1. SECTION 03 30 00: Cast-In-Place Concrete
  - 2. SECTION 31 10 00: Site Clearing

**1.02 DEFINITIONS**

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
- 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
- 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation

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and replacement material will be paid for according to Contract provisions for changes in Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders or rock material that exceed 1 cu. yd. for footing, trench and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom; measured according to SAE J-1179.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of the following manufactured products required:
1. Geotextiles.
  2. Warning tapes.
- B. Samples for Verification: For the following products, in sizes indicated below:
1. Geotextile: 12 by 12-inches.
  2. Warning Tape: 12-inches long; of each color.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified testing agency.



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- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
  - 1. Classification according to ASTM D 2487.
  - 2. Laboratory compaction curve according to ASTM D 1557.
- C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

**1.05 QUALITY ASSURANCE**

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
- B. Preexcavation Conference: Conduct conference at Project site.

**1.06 PROJECT CONDITIONS**

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify "Dig Safe System" for area where Project is located before beginning earth moving operations.
- C. Do not commence earth moving operations until temporary erosion and sedimentation-control measures, specified in Section 31 10 00 "Site Clearing," are in place.
- D. Do not commence earth moving operations until plant-protection measures specified, are in place.
- E. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- F. Do not direct vehicle or equipment exhaust towards protection zones.

- G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

## **PART 2 – PRODUCTS**

### **2.01 SOIL MATERIALS**

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145, or a combination of these groups; free of rock or gravel larger than 3-inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.
1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: NHDOT Item 304.2.
- E. Base Course: NHDOT Item 304.3.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2 inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of crushed stone, or crushed and uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2 inch sieve and 0 to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

### **2.02 GEOTEXTILES**

- A. Subsurface Drainage Textile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

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1. Survivability: Class 2; AASHTO M 288.
  2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
  3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
  4. Tear Strength: 56 lbf; ASTM D 4533.
  5. Puncture Strength: 56 lbf; ASTM D 4833.
  6. Apparent Opening Size: No. 40.
  7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
  8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
  2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
  3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
  4. Tear Strength: 90 lbf; ASTM D 4533.
  5. Puncture Strength: 90 lbf; ASTM D 4833.
  6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
  7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
  8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

**2.03 ACCESSORIES**

- A. Detectable Warning Tape: Acid and Alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6-inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30-inches deep; colored as follows:
1. Red: Electric.
  2. Yellow: Gas, oil, steam, and dangerous materials.
  3. Orange: Telephone and other communications.
  4. Blue: Water systems.
  5. Green: Sewer systems.

**PART 3 – EXECUTION**

**3.01 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### **3.02    DEWATERING**

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

### **3.03    EXCAVATION, GENERAL**

- A. Unclassified Excavations: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
  - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
    - a. 24-inches outside of concrete forms other than at footings.
    - b. 12-inches outside of concrete forms at footings.
    - c. 6-inches outside of minimum required dimensions of concrete cast against grade.
    - d. 6-inches beneath bottom of concrete slabs-on-grade.
    - e. 6-inches beneath pipe in trenches, and the greater of 24-inches wider than pipe or 42-inches.

### **3.04    EXCAVATION FOR STRUCTURES**

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1-inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  - 2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1-inch. Do not disturb bottom of excavations intended as bearing surfaces.
- B. Excavations at Edges of Tree and Plant-Protection Zones:
  - 1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

**3.05 EXCAVATION FOR WALKS AND PAVEMENTS**

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

**3.06 EXCAVATION FOR UTILITY TRENCHES**

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12-inches higher than top of pipe or conduit unless otherwise indicated.
  - 1. Clearance: As indicated on Drawings.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - 1. For pipes and conduit less than 6-inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  - 2. For pipes and conduit 6-inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
  - 3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
  - 4. Excavate trenches 6-inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trenches in Tree and Plant-Protection Zones:
  - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

**3.07 SUBGRADE INSPECTION**

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

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- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 30 mph.
  - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive bumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Authorize additional excavation and replacement material that will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

**3.08 UNAUTHORIZED EXCAVATION**

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
  - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

**3.09 STORAGE OF SOIL MATERIALS**

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

**3.10 BACKFILL**

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for record Documents.
  - 3. Testing and inspecting of underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring and bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

**3.11 UTILITY TRENCH BACKFILL**

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- A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Trenches Under Footings: Backfill trenches excavated under footings and within 18-inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 03 30 00 "Cast-In-Place Concrete."
- C. Backfill voids with satisfactory soils while removing shoring and bracing.
- D. Place and compact initial backfill of satisfactory soil, free of particles larger than 1-inch in any dimension, to a height of 12-inches over the pipe or conduit.
  - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- F. Install warning tape directly above utilities, 12-inches below finished grade, except 6-inches below subgrade under pavements and slabs.

**3.12 SOIL FILL**

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use satisfactory soil material.
  - 3. Under steps and ramps, use engineered fill.
  - 4. Under building slabs, use engineered fill.
  - 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

**3.13 SOIL MOISTURE CONTROL**

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

**3.14 COMPACTION OF SOIL BACKFILLS AND FILLS**

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- A. Place backfill and fill soil materials in layers not more than 8-inches in loose depth for material compacted by heavy compaction equipment, and not more than 4-inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to AASHTO T 191, AASHTO T 310:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12-inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
  - 2. Under walkways, scarify and recompact top 6-inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
  - 3. Under turf or unpaved areas, scarify and recompact top 6-inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

**3.15 GRADING**

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Turf or Unpaved Areas: Plus or minus 1-inch.
  - 2. Walks: Plus or minus 1-inch.
  - 3. Pavements: Plus or minus 1/2-inch.
- C. Grading Inside Building Lines: Finish subgrade to a tolerance of 1/2-inch when tested with a 10-foot straightedge.

**3.16 SUBSURFACE DRAINAGE**

- A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum 12-inches of filter material, placed in compacted layers 6-inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6-inches.



1. Compact each filter material layer to 85 percent of maximum dry unit weight according to AASHTO T 191, AASHTO T 310 with a minimum of two passes of a plate-type vibratory compactor.
- B. Drainage Backfill: Place and compact filler material over subsurface drain, in width indicated, to within 12-inches of final subgrade, in compacted layers 6-inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6-inches.
  1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698.
  2. Place and compact impervious fill over drainage backfill in 6-inch thick compacted layers to final subgrade.

### **3.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS**

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
  1. Place base course material over subbase course under hot-mix asphalt pavement.
  2. Shape subbase course and base course to required crown elevations and cross-slope grades.
  3. Place subbase course and base course 6-inches or less in compacted thickness in a single layer.
  4. Place subbase and base course that exceeds 6-inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6-inches thick or less than 3-inches thick.
  5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to AASHTO T 191, AASHTO T 310.
- C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12-inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to AASHTO T 191, AASHTO T 310.

### **3.18 FIELD QUALITY CONTROL**

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  2. Determine that fill material and maximum lift thickness comply with requirements.
  3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

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- B. Testing Agency: Engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- E. Testing agency will test compaction of soils in place according to AASHTO T 191, AASHTO T 310, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
  - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length, but no fewer than two tests.
  - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.
- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

**3.19 PROTECTION**

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

**3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

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- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
  - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

**END OF EARTH MOVING**