New York State
Parks, Recreation and
Historic Preservation

Agency 1290000

PROJECT MANUAL

FL-RT-2026-001
Restroom #3
Robert H. Treman State Park

BID PROPOSALS FOR THE FOLLOWING CONTRACT(S):
GENERAL CONTRACT WORK (GCW) – D006612
ELECTRICAL CONTRACT WORK (ECW) – D006613
MECHANICAL CONTRACT WORK (HCW) – D006614
PLUMBING CONTRACT WORK (PCW) – D006615

Are Due via email at:
1:00 PM
on
November 4, 2026

Bid proposals will be opened exclusively via Webex at:
1:30 PM
on
November 4, 2026

Webex Link at attend:
https://meetny-gov.webex.com/meetny-gov/j.php?MTID=m5bbf89f02578d65620a61a1f08048cf9

CONTACT PERSONS:	Assistant District Manager	Brian Burnett / (315) 479-3252
	Project Manager	Mikayla Elliott / (607) 539-4049
	Administrative	Dawn Barker / (315) 479-3234

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NEW YORK STATE OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION

NOTICE TO BIDDERS

Sealed bids for Restroom #3 at Robert H. Treman State Park, Town of Ithaca, Tompkins County, New York will be received by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP), via email at MidState.Capital.Procurement@parks.ny.gov. Electronically submitted bids must only be attached in PDF format– hyperlinks will not be accepted. Note: There is a 20MB limit when submitting attachments via email. If email is not an option for the bidder an alternate address will be provided upon written request to a designated contact. Deadline for bid submission is 1:00 PM **local time, Wednesday, November 4, 2026.** Sealed bids will be publicly opened and read via **WebEx only** at 1:30 PM local time, Wednesday, November 4, 2026. The Contract D number should be clearly marked in the subject line of your email, along with the words "BID SUBMISSION". Each bid must be prepared and submitted in accordance with the Instructions to Bidders and must be accompanied by a scanned Bid Security in the form of a certified check, bank check, or bid bond in the amount of: As shown below.

Note: The original hardcopy bid bonds for the two lowest bidders must be postmarked and sent via certified mail within 48 hours of receiving the bid summary from the Office.

General Construction Contract Provide all labor, material, and equipment necessary for the construction and making operational of the Restroom #3 building, and miscellaneous site improvements as shown in the contract documents. Engineer's Estimate Range: $983,048.00 to $1,330,007.00.	D006612	$57,850.00	Fifty-Seven Thousand Eight Hundred Fifty Dollars and Zero Cents.
Mechanical Contract Provide all labor, material, and equipment necessary for installing and making operational all mechanical systems to include all required concrete mounting pads as shown in the contract documents. Engineer's Estimate Range: $87,086.00 to $117,823.00.	D006614	$5,150.00	Five Thousand One Hundred Fifty Dollars and Zero Cents.
Electrical Contract Provid all labor, material, and equipment necessary for installing and making	D006613	$10,200.00	Ten Thousand Two Hundred Dollars and Zero Cents.

operational all electrical systems as shown in the contract documents. Engineer's Estimate Range: $172,877.00 to $233,892.00.			
Plumbing Contract Provide all labor, material, and equipment necessary for installing and making operational all plumbing systems as shown in the contract documents. Engineer's Estimate Range: $300,901.00 to $407,102.00.	D006615	$17,750.00	Seventeen Thousand Seven Hundred Fifty Dollars and Zero Cents.

The Bid opening will be conducted **ONLY** via WebEx at the link listed below:

https://meetny-gov.webex.com/meetny-gov/j.php?MTID=m5bbf89f02578d65620a61a1f08048cf9.

MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE PARTICIPATION GOALS (MWBE)

The following goals for MWBE participation on this project have been established at:

General Construction – D006612

Minority Owned Business Enterprise (MBE)	12 %
Women Owned Business Enterprise (WBE)	18 %

Mechanical – D006613

Minority Owned Business Enterprise (MBE)	16 %
Women Owned Business Enterprise (WBE)	14 %

Electrical - D006614

Contractor must make a Good Faith Effort (GFE) to obtain MWBE Suppliers and Subcontractors

Plumbing - D006615

Minority Owned Business Enterprise (MBE)	10 %
Women Owned Business Enterprise (WBE)	20 %

PUBLIC BUILDING LAW § 8(6)

Pursuant to Public Building Law § 8(6), any contracts over $5,000 for the work of construction, reconstruction, alteration, repair, or improvement of any State building, a responsible and reliable NYS-certified Minority or Women-Owned Business Enterprise that submits a bid within ten percent of the

lowest bid will be deemed the apparent low bidder provided that the bid is $1,737,918 or less (maximum amount has been adjusted for inflation effective January 1, 2026). If more than one responsible and reliable MWBE firm meets the requirements, the MWBE firm with lowest bid will be deemed the apparent low bidder.

PROJECT COMPLETION

The completion date for this project is 525 Days after agreement has been approved by the NYS Comptroller's Office.

Starting on the advertisement date, the Bidding and Contract Documents may be examined free of charge and obtained via email from Dawn Barker at Dawn.Barker@parks.ny.gov.

In accordance with State Finance Law, Section 139-j, the following agency staff have been designated as contacts for this contract:

Name	**Phone #**	**E-mail Address**
Brian Burnett	(315) 479-3252	Brian.Burnett@parks.ny.gov
Mikayla Elliott	(607) 539-4049	Mikayla.Elliott@parks.ny.gov
Dawn Barker	(315) 479-3234	Dawn.Barker@parks.ny.gov

Please note that contacting any other agency staff regarding this contract may be a violation of State Finance Law, Section 139-j, resulting in a determination of contractor non-responsibility.

GENDER-BASED VIOLENCE AND THE WORKPLACE CERTIFICATION effective November 2025

Pursuant to New York State Finance Law §139-M, all bidders on competitive state procurements are required to certify that they maintain a written policy addressing gender-based violence in the workplace. (Please review the form for details regarding minimum requirements.) Each bid submission must include a signed and completed copy of the certification form. If an organization is unable to make the certification, a signed statement explaining the reason must be submitted with the bid. **Failure to include the completed form or explanatory statement with the bid submission will result in disqualification.** The template form will be provided with the bidding documents.

CONTRACTOR REGISTRY REQUIREMENT effective December 2024

Newly established subsection 220-i to NYS Labor Law Article 8 requires contractors and subcontractors to register with the Bureau of Public Work and Prevailing Wage Enforcement for public work. Contractors must complete registration prior to bidding on public work projects covered under Article 8 of Labor Law.

The effective date of the registration requirement was **December 30, 2024**. Bidders must prove they are registered at the time of bid opening by submitting a digital copy of their company's registration certificate with their bid. **Failure to provide the registration certificate at bid opening will result in automatic disqualification.** The apparent low bidder will additionally be held responsible for providing copies of registration certificates for all subcontractors on their approved Utilization Plan before subcontractors commence work.

Please refer to this website for information: https://dol.ny.gov/contractor-and-subcontractor-landing
The registration login page is found here: Log In - Management System for Protecting Workers' Rights

EXECUTIVE ORDER No. 16

The successful bidder will be required to furnish an Executive Order No. 16 certification form prior to contract award.

The Executive Order can be found here: https://www.governor.ny.gov/executive-order/no-16-prohibiting-state-agencies-and-authorities-contracting-businesses-conducting

The Executive Order Certification Form can be found here:
https://ogs.ny.gov/system/files/documents/2022/04/eo16_certification.pdf

BONDS

The successful bidder will be required to furnish a Performance Bond and a Labor and Material Bond/Payment Bond in the statutory form of public bonds required by Sections 136 and 137 of the State Finance Law, each for 100% of the amount of the Contract.

All Requests For Information (RFIs) are due by:	1:00 PM	on	Friday, October 16, 2026

RFIs received after this due date and time will not be processed.

There will be a pre-bid meeting on: N/A

State's Rights to Proposals

By submitting a bid, the Bidder agrees not to make any claim for, or have any right to, damages because of any misinterpretation or misunderstanding of the specifications, or because of any misinformation or lack of information. OPRHP reserves the right to exercise the following:

- Change any of the scheduled dates herein;
- Amend IFB requirement(s) after their release to correct errors or oversights, or to supply additional information as it becomes available;
- Withdraw the IFB, at its sole discretion without any obligation or liability to any vendor;
- Eliminate any mandatory, non-material requirement that cannot be complied with by all of the prospective Bidders;
- Evaluate, accept and/or reject any and all bids, in whole or in part, and to waive technicalities, irregularities, and omissions if, in OPRHP's judgement, the best interests of OPRHP will be served. In the event compliant bids are not received, OPRHP reserves the right to consider late or non-conforming bids as offers;
- Require the Bidder to demonstrate, to the satisfaction of OPRHP, any information presented as part of their proposal;
- Require clarification at any time during the procurement process and/or require correction of arithmetic or other apparent errors for the purpose of assuring a full and complete understanding of a Bidder's proposal and/or to determine a Bidder's compliance with the requirements of this solicitation;
- Disqualify any Bidder whose conduct and/or bid fails to conform to the requirements of the solicitation;

- Use proposal information obtained through OPRHP investigation of a Bidder's qualifications, experience, ability or financial standing, and any material or information submitted by the Bidder in response to OPRHP's request for clarifying information in the course of evaluation and selection under this IFB;
- Prior to the award, determine a tie breaking mechanism for award of the Contract to serve the best interests of OPRHP and the State of New York;
- Negotiate with the successful Bidder within the scope of the IFB to serve the best interests of OPRHP and the State of New York;
- Conduct Contract negotiations with the next ranked responsible Bidder, should OPRHP be unsuccessful in negotiating an Agreement with the selected Bidders;
- Move to the next ranked responsible low Bidder should the low bidder fail to implement the requirements of the bid;
- If OPRHP terminates the Contract for non-performance, OPRHP reserves the right, with the approval of the New York State Office of the Attorney General and the Office of the State Comptroller, to award a contract to the next highest ranked Bidder of the original bid submission within the first twelve months of the award;
- Utilize any and all ideas submitted in the bids received;
- Make an award under the IFB in whole or in part; and
- Seek revisions of bids.

Bids containing false or misleading statements, or which provide project contacts that do not support an attribute or condition claimed by a Bidder, may be disqualified from consideration. If, in the opinion of OPRHP, a statement is intended to mislead OPRHP in its evaluation of the bid, and the attribute, condition, or capability is a requirement of the IFB, the bid shall be disqualified from consideration.

Response to Bidder Questions and Requests for Clarification

OPRHP will provide a written response to all substantive questions and requests for clarification.

Tie Bids

In the event there is a tie final determination will be made by the OPRHP Deputy Commissioner for Capital.

Modification or Withdrawal of Bids

Bid modifications that are submitted in writing and signed by an authorized representative of the bidding firm will be considered for award if received by OPRHP prior to the scheduled proposal due date. Bids may be withdrawn or cancelled prior to the scheduled proposal due date. A bid may be rejected by OPRHP: if it shows any alteration of terms, conditions, or requirements; for any other irregularities; if it is incomplete, or if it offers an alternate bid not invited by the specifications.

Freedom of Information Law

Your bid to OPRHP, including accompanying documents, is subject to the Freedom of Information Law (FOIL) found in Article 6 of the N.Y. Public Officer Law. FOIL provides that certain records are exempt from disclosure, including those that contain (1) trade secrets, (2) information that, if disclosed, would cause substantial injury to the competitive position of your organization, or (3) critical infrastructure information. Records may be redacted to protect only the portions of documents that fall within a FOIL exemption. An entire document may not be withheld if only a portion of the document is exempt from disclosure. Blanket assertions that information is a trade secret, confidential, or proprietary are insufficient to justify withholding information under FOIL. If you identify information seeking an exemption from public disclosure due to the above-mentioned reasons such request will be reviewed, and a determination will be made as to whether the information is exempt from disclosure under FOIL. However, such submissions seeking non-disclosure will not be considered unless it is accompanied with an explanation justifying the privilege. The State's determination may be appealed pursuant to POL §89(5)(c). Pursuant to POL §87(2)(b), the State, without having to request it, will redact information that "if disclosed would constitute an unwarranted invasion of personal privacy."

Timely Submission

The Bidders are solely responsible for timely delivery of their bid to the location set forth by the stated bid due date/time and are solely responsible for delays in receipt, including but not limited to those due to third-party carriers.

Bidder Proposal Clarification

Prior to award, OPRHP reserves the right to seek clarifications, request proposal revisions, or to request any information deemed necessary for proper evaluation of proposals from all Bidders deemed to be eligible for Contract award. Failure of a bidder to cooperate with OPRHP's effort to clarify a proposal may result in the proposal being labeled as non-responsive and be given no further consideration.

Additionally, OPRHP reserves the right to use information submitted by the Bidder in response to OPRHP's request for clarifying information in the course of evaluation and selection under this IFB.

Bid Review and Contract Approval

The Contract resulting from this IFB will not be effective until approved by the Office of the Attorney General and the Office of the State Comptroller.

Debriefing Sessions

A debriefing is available to any entity that submitted a proposal or bid in response to a solicitation ("Bidder"). A Bidder will be accorded fair and equal treatment with respect to its opportunity for debriefing.

Debriefing must be requested in writing by any bidder within fifteen (15) calendar days of OPRHP notifying the unsuccessful bidders that another vendor was selected.

A bidder's written request for a debriefing must be submitted to the designated contact listed on the cover of this IFB.

The debriefing will be scheduled within ten (10) business days of receipt of written request by OPRHP or as soon after that time as practicable under the circumstances.

Bid Protest Procedure

OPRHP procedures for handling protests of bid awards are set forth in the Bid Protest Procedures which can be found at the end of this document.

Indemnification

The Contractor agrees to indemnify, defend, save, and hold harmless the State of New York, OPRHP, and their officers, employees, and agents of and from any claims, demands, actions, or causes of action of any kind arising out of the services of the Contractor provided for in this agreement.

Solicitation

This IFB is a solicitation to bid, not an offer of a contract.

Bid Protest Procedures

It is the policy of the Office of Parks, Recreation and Historic Preservation (OPRHP) to provide bidders with an opportunity to administratively resolve disputes or inquiries related to OPRHP contract awards. Bidders are encouraged to seek resolution of disputes through consultation with the Designated Contact(s). After being notified of the results of this contract opportunity, any entity or individual that participated in the procurement may submit a protest of the resulting contract award.

OPRHP reserves the right to suspend, modify, or cancel this procurement at any time during the procurement process. OPRHP also reserves the right to waive or extend the deadlines in this procedure.

Submission of Formal Written Protests

Protests must be received by the Designated Contact no later than five (5) business days after a debriefing or ten (10) business days after the written notice of selection or non-selection for contract award, whichever is later.

Protests must be submitted in writing, clearly marked as a protest on the envelope or in the email subject line, and include the following information:

1. Solicitation or contract number
2. Name, address, email address and telephone number of the filer
3. Detailed statement of the legal and factual grounds for the protest
4. Statement of the relief requested
5. Copies of relevant documents

Agency Response

Within 30 business days of receipt of a protest, OPRHP's protest officer (the Director of Audit or her designee) will respond with a protest determination stating the agency's decision on the protest and the reasoning on which it is based. In making a determination, the protest officer will consider the legal and factual grounds stated in the protest, consult with the Designated Contact and appropriate program staff, and review all relevant documents.

Finality; Appeal

For contract opportunities subject to the approval of the Office of the State Comptroller, the protesting party may appeal OPRHP's protest determination to the Office of the State Comptroller in accordance with the regulations contained in Part 24 of Title 2 of the New York Codes, Rules and Regulations.

For contract opportunities that are not subject to the approval of the Office of the State Comptroller, OPRHP's protest determination is the conclusive and final determination of the protest.

Nothing in these bid protest procedures is intended to limit or impair the rights of any bidder to seek and pursue remedies of law through the judicial process.

NEW YORK STATE OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION

INSTRUCTIONS TO BIDDERS

EXAMINATION OF DOCUMENTS

Carefully examine and be familiar with the Bidding and Contract Documents.

Examine the information concerning subsurface or other latent physical conditions. It is presentedin good faith but is not intended as a substitute for personal investigation, interpretations or judgmentof the Contractor.

VISIT TO THE SITE

Visit the site of the work prior to submitting bid. Phone Designated Contact listed on the Notice toBidders for appointment 24 hours in advance of visit. For further information on site visit instructions, please refer to the Notice To Bidders.

Become familiar with restrictions and regulations relating to the Facility. Existing restrictions andregulations will not be considered as grounds for any additional cost over the Contract sum.

Assume the risk of encountering any subsurface or other latent physical condition which can be reasonably anticipated on the basis of documentary information provided by the Office of Parks, Recreation and Historic Preservation (the Office) and from inspection and examination of the site.

Interpretations of Contract Documents by Facility personnel are not binding.

RESOLUTION OF DISCREPANCIES AND AMBIGUITIES

Direct all questions regarding the intent or meaning of the drawings or specifications to the contactperson identified on the cover of the Contract Documents. Such an inquiry may be telephoned orsubmitted in writing using provided RFI form. The reply to such an inquiry, when deemed necessary, will be communicated by Addendum to all persons who have obtained drawings and specifications.

Pre-bid inquiries answered by means other than Addenda will not be binding.

PREPARATION OF BIDS

Bidders shall submit bids on the official form furnished by the Office. Make no changes of any kindin the bid form phraseology, or anywhere on the bid form. Fill in all blank spaces legibly and in ink. Once the form has been completed in ink, bidders shall scan and email the bid form and

bid security to the email address listed on the Notice to Bidders. The document must be in PDF format – any hyperlink to the file will not be accepted. Please note, there is a 20MB limit when submitting attachments via email. If email is not available to the bidder, an address for hard copies can be obtained from the designated contact identified on the Notice to Bidders. All amounts shall be given in full in both writing and also in figures. In case of a discrepancy between the amount written in words and that given in figures, the amount written in words is binding. Make no erasures on the bid form. If a mistake is made, use a new bid form. New formsmay be obtained at the email address shown on the Notice to Bidders.

When the Contract Documents require alternate price quotations, indicate the amounts to be addedto or deducted from the base bid. If the work is to be performed at no change in cost, indicate theword "NONE". Any bid which fails to indicate a sum or the word "NONE", shall be considered informal and may be rejected.

Sign the bid form in the space provided. An officer or a principal of a corporation or a partnership signing for the bidder shall print or type the legal name of the person, partnership or corporation onthe line provided and place his or her signature after "SIGN BID HERE". The same procedure shallapply to the bid of a joint venture by two or more firms, except that the signature and title of an officer or a principal of each member firm of the joint venture shall be required.

Note in the spaces provided on the bid form, the Addenda, by numbers and dates, which have beenreceived. If no Addenda have been received, insert the word "NONE".

ADDRESS OF PROSPECTIVE BIDDER

Use street address in addition to a Post Office Box address (if any).

BID SECURITY INFORMATION

Bid Security, in the amount shown on the Notice to Bidders, is required to be submitted with the bid as a guarantee that the bidder will enter into the Contract if awarded, and that the bidder will furnish all required information to enter into the Contract within ten days after receipt of notice of award. All bidders are required to scan their bid security and include the copy with their electronically submitted bid. The document must be in PDF format – any hyperlink to the file will not be accepted. Please note, there is a 20MB limit when submitting attachments via email. Bid Security shall consist of a bid bond or a certified check or a bank check drawn upon a legally incorporated bank or trust company and payable to the Office of Parks, Recreation and Historic Preservation. The bid bond must be from a Surety company approved by the State. The form of any bid bond and the surety issuing it shall be subject to the approval of the Office. The original hardcopy bid bonds for the two lowest bidders must be postmarked and sent via certified mail within 48 hours of receiving the bid summary from the Office. The Bid Security of the two lowest bidders will be returned upon the acceptance of the Performance and the Labor and Material Bonds and the execution of the Contract by the lowest bidder. The Bid Security of all other bidders will be returned as soon as possible after the low bidder is determined.

NEW YORK STATE BUSINESSES INFORMATION

Contractors are encouraged to use and work with New York State Businesses. Accordingly, bidders are required to complete and submit the form which will allow us to track this information. Please complete and include the form "Encouraging Use of New York State Businesses in Contract Performance" with your bid. The apparent low bidder will be asked to identify the New York State businesses that will be used.

SUBMISSION OF BID

Submit Bid Form and Bid Security, if required in the Notice to Bidders, via scanned hard copies to the email listed in the notice to bidders.

The Contract D number and Company Name should be clearly marked in the subject line of the email, along with the words "BID SUBMISSIONS".

All bids must be received at or before the time specified on the Notice to Bidders, whether to the email address or the physical mailing address designated for bid opening. **Failure to include an electronic copy of your DOL registration certificate AND a completed/signed copy of the Gender-Based Violence and the Workplace Certification with your bid by the bid opening date and time WILL result in disqualification.**

A late bid will be considered if (1) its arrival at the place designated after the time specified can beshown by documentary or other proofs to be due to the mishandling by employees of the Office and
(2) that absent such mishandling, the bid would have arrived timely. Delays in the U.S. Mail or anyother means of transmittal, including by couriers or agents of the State of New York (State), otherthan employees of the Office will not suffice to excuse late arrival.

A late bid not eligible for consideration will be returned unopened with notification of the reason forits refusal.

MODIFICATION OF BID

Bid modifications by amendment may be considered on condition that:

1. The amendment arrives before the time set for the bid opening.
2. The amendment is in writing and signed by the bidder.
3. The bid, as amended, conforms in all respects with the Contract Documents.

WITHDRAWAL OF BID

A bid may be withdrawn at any time prior to the time specified for opening.

After the bid opening, a bidder may request the withdrawal of its bid by a written application on thegrounds of a demonstrable mistake. Such written application must be made within seven days afterthe bid opening unless the Office, at its sole discretion, grants a time extension. Upon receiving suchwritten application, the Office will review and decide the bidder's withdrawal request based on thethree elements below. A bid may be withdrawn if, before any detrimental change of position by theState has occurred, the bidder establishes that:

1. a verifiable error occurred in the computation of the bid, and
2. absent the mistake the bid would have been substantially higher, and
3. if directed to proceed with the Contract at the price set forth in the bid, the bidder wouldsuffer a substantial loss on the contract.

Each element must be proven by clear and convincing evidence in order to justify withdrawal. Thejudgment of the Office shall be final and conclusive. Should the judgment be against allowing withdrawal, then the failure of the bidder to proceed would be cause for forfeiture of its bid bond.

DISQUALIFICATION OF BIDDERS

The State reserves the right to disqualify bids, before or after opening, upon evidence of collusion with intent to defraud or other illegal practices upon the part of the bidder.

OPENING OF BIDS

Bids shall be opened as announced in the Notice to Bidders. Bidders or their authorized agents are invited to attend via Webex.

AWARD OF CONTRACT

The Contract may be awarded to the lowest responsible and reliable bidder as will best promote public interest.

If alternates are included in the bidding documents, the Office reserves the right to accept or rejectany or all alternates. The lowest bid will be determined by the sum of the base bid and, where applicable, the accepted alternates and/or unit pricing in the manner prescribed on the Bid Form.

If alternate base bids are indicated in the bidding documents, the low bid will be determined by thelowest amount bid for any of the alternate base bids.

The Office reserves the right to reject any or all bids, and advertise for new bids, if in its opinion thebest interest of the Office will hereby be promoted. In the event that all bids are rejected, each bidderwill be so notified.

No later than 45 days after the bid opening, the Office shall accept bids or reject all bids. Written notification of acceptance with the final Contract shall be emailed or delivered to the selected bidder. If the selected bidder fails to execute and return the Contract with the bidder's Performance Bond,Labor and Material Bond, and Certificate of Insurance, within ten days of receipt of notification, theOffice shall have the right to reject the bid and select next lowest bidder. In this case, the Bid Security of the first bidder shall be forfeit.

INFORMALITIES

Any bid which fails to conform to the requirements of the Bidding and Contract Documents may berejected.

The Commissioner or Commissioner's Representative reserves the right to waive as an informality any irregularity contained in any bid or afford the bidder an opportunity to remedy any deficiencyresulting from a minor irregularity.

EQUAL EMPLOYMENT OPPORTUNITY

If the value of this contract exceeds $25,000, no later than seven days after being notified of the award of the contract, the Bidder shall submit an Equal Employment Opportunity Policy Statementon a form to be provided by the Office.

DETERMINATION OF CONTRACTOR'S RESPONSIBILITY

1. The State Finance Law requires that contracts for public work in the State of New York be awarded to the lowest responsible and reliable bidders as will best promote the public interest.

2. In order to assist the State in determining the responsibility and reliability of the apparentlow bidder for any competitively bid contract of $100,000 or more, and any proposed subcontract work valued at $100,000 or more, each apparent low bidder and all proposed subcontractors will be required to submit a "New York State Vendor Responsibility Questionnaire For-Profit Construction" (Form CCA-2) prior to contract award or subcontractor approval.

3. The apparent low bidder must submit a completed "New York State Vendor ResponsibilityQuestionnaire For-Profit Construction" (Form CCA-2) to the foregoing address within 24hours after the bids are opened.

4. The Office recommends that vendors file the required Vendor Responsibility Questionnaireonline via the New York State VendRep System, however, vendors may

choose to completeand submit a paper questionnaire. To enroll in and use the New York State VendRep System, see the VendRep System Instructions available at : *http://www.osc.state.ny.us/vendrep/vendor_index.htm* or go directly to the VendRep Systemonline at https://portal.osc.state.ny.us. For direct VendRep System user assistance, the Officeof the State Comptroller's Help Desk may be reached at 866-370-4672 or 518-408-4672 orby email at *ciohelpdesk@osc.state.ny.us*. Vendors opting to file a paper questionnaire canobtain the appropriate questionnaire from the VendRep websitewww.osc.state.ny.us/vendrep or may contact the Office of Parks Recreation and HistoricPreservation (if not included already in these documents).

5. ADDITIONAL CONTRACTOR RESPONSIBILITY

(A) Contractor shall at all times during the Contract term remain a responsible vendor. Contractor agrees, if requested by the Office, to present evidence of its continuing legal authority to do business in New York State, its integrity, experience, ability, prior performance, and organizational and financial capacity to carry out the terms of this Contract.

(B) The Office reserves the right to suspend any or all activities under this Contract, at any time, when the Office discovers information that calls into question the responsibility of Contractor. In the event of such suspension, Contractor will be given written notice outliningthe particulars of such suspension. Upon issuance of such notice, Contractor must complywith the terms of the suspension order. Contractual activities may resume at such time as theOffice issues a written notice authorizing resumption of contractual activities.

(C) Notwithstanding the provision of Article 15 of the General Conditions of the Contract pertaining to Termination and Revocation, upon written notice to Contractor and a reasonable opportunity to be heard with appropriate Office staff, this Contract may be terminated by the Office at Contractor's expense where Contractor is determined by the Offices to be non-responsible. In such event, State Parks may pursue available legal or equitable remedies for breach.

OMNIBUS PROCUREMENT ACT OF 1992

1. It is the policy of the New York State Office of Parks, Recreation and Historic Preservation to maximize opportunities for the participation of New York State business enterprises, including minority and women-owned enterprises, as bidders, subcontractors and supplierson its procurement contracts.

2. Information on the availability of New York State subcontractors and suppliers is available from:

   NYS Department of Economic Development
   Division for Small Business
   One Commerce Plaza, 9th Floor

Albany, NY 12245
Telephone: (212) 803-3149 E-mail: nylovessmbiz@esd.ny.gov

NOTE: Companies requesting lists of potential subcontractors and suppliers are encouraged toidentify the NAICS code, size and location of vendors.

3. A directory of certified minority and women-owned business enterprises is available online at **https://ny.newnycontracts.com/FrontEnd/searchcertifieddirectory.asp** or from:

NYS Department of Economic Development
Division of Minority and Women's Business Development
625 Broadway
Albany, New York 12207
Telephone: (646) 846-7364 E-mail: MWBEBusinessDev@esd.ny.gov

4. Bidders located in foreign countries are hereby notified that New York State may seek to obtain and assign or otherwise transfer offset credits created by this procurement contractto third parties located in New York State. The successful contractor shall agree to cooperate with the State in efforts to get foreign countries to recognize offset credits createdby the procurement contract.

5. When the bid amount is equal to or greater than $1,000,000, the bidder is required to certifycompliance with the Omnibus Procurement Act of 1992 to the Office in its bid proposal.

6. The apparent low bidder will be required to submit documentation of such compliance withthe requested documents.

WORKERS' COMPENSATION INSURANCE AND DISABILITY BENEFITSREQUIREMENTS

A policy covering the obligations of the Contractor in accordance with the Workers' CompensationLaw and the Disability Benefits Law covering all operations under the contract, whether performedby the contractor or the subcontractor is required for all contracts. See Article 21.3 of the General Conditions.

ELECTRONIC PAYMENTS

Per the General Conditions article 23 section 12, the Office **requires** all Contractors and Vendors doing business with New York State to enroll in and receive payments electronically.

Visit the State Comptroller's website: *http://www.osc.state.ny.us/vendors/index.htm#epayment* to enroll in the ePayments Program.

FORMS

Various provisions of the bidding and contract documents may require a bidder or contractor to submit certain forms. Not all forms will be required of all bidders, and some forms, such as Bid Bonds, Performance Bonds and Labor and Material Bonds will generally be provided by others(e.g., the American Institute of Architects - AIA). However, samples and/or copies of all forms are available from the Contact Person(s) designated on the first page of the Bidding and Contract documents. Forms available from the Contact Person include but are not limited to: Reporting forms for State and Federal programs which provide for participation by minority group members and women as suppliers, subcontractors and employees; Contractor's Monthly Activity Report and Application for Payment; Certificate of Acceptance (final payment); Prime Contractor's Certification; Subcontractor's Certification; Workers Compensation and Payroll Forms.

NYS Office of Parks, Recreation and Historic Preservation

Click here to enter Region.

REQUEST FOR INFORMATION (RFI)
OPR-103

Project: Restroom #3 at Robert H. Treman State Park

Contract Number: D006612, D006613, D006614, D006615

Request From: Click here to enter Your Name .

Reply Email Address: Click here to enter Parks reply email.

Email Request to :Click here to enter Parks Name and , email address.

Request Number: Click here to enter text. Date: Click here to enter a date.

Spec Section No.: Click here to enter text. Drawing No:Click here to enter text.

Remarks:

Question: Click here to enter text.

Answer: Click here to enter text.

SAMPLE

Sample Forms

Sample Forms

Forms Provided to All Bidder**s, but for use by Low Bidder**(s)

Form	**Purpose/Use**
Intent to Award Letter	Information for Selected Low Bidder *
Sample OPRHP Agreement	See Intent to Award letter for more information
Vendor Responsibility Questionnaire Acknowledgement	Vendor Responsibility Questionnaire found on OSC website: https://www.osc.ny.gov/state-vendors/vendrep/vendrep-system
EO 16 Certification	See Intent to Award letter for more information
Bid Confirmation Form	See Intent to Award letter for more information
Cost Estimating workbook	See the Intent to Award letter for more information
Construction Summary of Sub-Contractors	See Intent to Award letter for more information

* This document outlines various submittal documents that will have to be submitted by the **selected bidder.** If the selected bidder fails to meet the prescribed submittal deadlines, the Office shall have the right to reject the bid and proceed with the next lowest bidder. In this case, the Bid Security of the first low bidder shall be forfeit.

SAMPLE

New York State
Parks, Recreation and
Historic Preservation

KATHY HOCHUL
Governor

KATHY MOSER
Commissioner

May 6, 2026

Recipient Name
Company Name
Street Address
City, State Zip Code

Re: Project Name
Location or State Park Name
Contract # D00XXXX
Notice of Intent to Award Contract

SAMPLE

I am pleased to inform you that the NYS Office of Parks, Recreation & Historic Preservation (OPRHP) has accepted your bid in the amount of $Amount in numbers (Dollar amount in words dollars and Cent amount in words cents) for the above project as the identified low bidder and is offering to enter into a contract for the proposed work, subject to necessary approvals.

After you have received this letter - **the following submittals shall be completed and sent electronically to the designated contact, Name of admin contact Admin e-mail address of OPRHP, within three (3) business days**:

- Signed Bid Confirmation form
- OPR 102 form – Itemized Breakdown/Schedule of Values
- NYS Vendor Responsibility Questionnaire (CCA-2) – complete all sections.
  - This submission can be completed on-line as noted below:
    Please note: ALL vendors required to complete the CCA-2 must be registered for an SFS vendor ID, regardless of whether completed online or in hardcopy format.
    - ❖ Please use the following web address to sign in: Log In – New York State Vendrep System
    - ❖ It is recommended that you complete the CCA-2 online. If you have completed a hardcopy CCA-2 within the past 6 months, please complete and sign the attached certification form. This document signifies that your questionnaire is current within the designated period.
  - All sub-contractors anticipated to earn $100,000.00 or more from this contract must each update their own CCA-2 at this time as well.

Also, within ten (10) business days the selected low bidder shall submit the following:

- **MWBE Utilization Plan – an approved Utilization Plan is required as part of the contract packet that is sent to the approving agencies, so it is crucial MWBE/SDVOB information is submitted to the Diversity Compliance team in a timely manner. Please adhere to the time submission listed above.** The Utilization Plan is now done in electronic form. Once Diversity Compliance is notified of this award, expect an email with further instructions within the next few business days.

- Agreement - signed, dated, and notarized. Date used on the agreement and notary pages **must** be the same date.

(Continued on next page->)

- EO 16 Certification (Prohibition of contracting with businesses conducting business in Russia)
- Summary of Subcontractors and Estimated Earnings Form - must match approved MWBE Utilization Plan
- DOL Registration Certificates for ALL subcontractors on approved MWBE Utilization Plan
- Original ACORD 25 Insurance Certificates (for Liability Coverage) *
- Original ACORD 855 Insurance Certificates (for Liability Coverage) *
- Workers Compensation Certificate (provide on Form C-105.2 as issued by NYS) *
- NYS Disability Benefit Certificate (provide on Form DB-120.1 as issued by NYS) *

  * **Make sure the Certificate Holder box has the following address for all Insurance Certificates**:
  New York State Office of Parks, Recreation and Historic Preservation
  625 Broadway
  Albany, NY 12238

- 1 executed copy of the Performance Bond/Payment Bond <u>AND</u> 1 executed copy of the Labor and Material Bond
  – Contractor's signature and Surety signature must be notarized, and <u>each bond must have a separate, original notary page</u>. The bond date, construction date, and notary acknowledgement need to be the same date and **cannot be dated prior to the date in the Agreement**. Bonds must include Surety's Financial Statement and Power of Attorney.

- In addition to the general contract requirements, please refer to the specifications and provide Quality Assurance qualifications for the Prime and any Proposed Subcontractors. Please include a breakdown of similar Project Experience with photographic examples as well as resumes, if applicable.
  The following spec. sections require qualifications to be provided:
  Please copy/paste the relevant section(s) of the project manual's spec section in this field.
  If there are no required work qualifications for this project, type "(None)".

OPRHP reserves the right to move to the next responsible low bidder if good-faith efforts are not made by the low bidder to provide all requested documentation within ten (10) business days.

<u>DOL Public Work Contractor and Subcontractor Registration</u>

NYS Labor Law Article 8 requires contractors and subcontractors to register with the Bureau of Public Work and Prevailing Wage Enforcement for public work. This registration must be completed prior to bidding on public work projects covered under Article 8 of Labor Law.

SAMPLE

The effective date of the registration requirement was **December 30, 2024**. Bidders must prove they are registered at the time of bid opening by submitting a digital copy of their company's registration certificate with their bid. **Failure to provide the registration certificate at bid opening will result in automatic disqualification.** The apparent low bidder will additionally be held responsible to provide copies of registration certificates for all subcontractors on their approved Utilization Plan before subcontractors commence work.

Please refer to this website for information: NYS DOL Public Work Contractor & Subcontractor Registry
The registration login page is found here: Log In – Management System for Protecting Workers' Rights

Electronic Payments (ePayments)

If not already enrolled, you must update your payment method in the SFS Vendor Portal to electronic deposit, per the General Conditions article 23 section 2 in the project manual.

Additional information can be found at: Log In – Vendor Portal

A completely executed contract will be returned to you after the necessary approvals are obtained. At that time, we will schedule a preconstruction meeting to discuss the project and specific contract requirements. No project work can physically start until all necessary approvals have been granted. Please be advised that this office will retain your bid bond in the amount of $Bid Bond amount in numbers until such time that the enclosed contract documents are executed and returned along with the Performance, Labor and Material Bond/Payment Bond.

We look forward to a great working relationship throughout this contract.

Sincerely,

Tyler Hoerz
Director, Capital Bureau

SAMPLE

NEW YORK STATE
OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION

SAMPLE AGREEMENT – PROVIDED HERE FOR INFORMATIONAL PURPOSES ONLY

This Agreement made by and between the State of New York, acting by and through the Office of Parks, Recreation and Historic Preservation, hereinafter referred to as the "Office" or the "State" and_____hereinafter referred to as the "Contractor".

W I T N E S S E T H

1) The Contractor agrees to perform the Work in accordance with the Contract Document which is incorporated herein

PROJECT NAME
STATE PARK
Contract # D00XXXX

2) The Contractor agrees to complete the Work no later than **XXX days after contract is approved by the NYS Controller's Office.**

3) The Contractor agrees, in the event the Contractor fails to complete all the work on time, to pay the Office liquidated damages as per the General Conditions, Article 14.10, for each day of delay in the physical completion of the Work.

4) The Office agrees to pay the Contractor in accordance with the Contract Documents and in consideration of the completion of the Work, as follows:

IN WORDS:

IN NUMBERS:

5) Goals for the participation of minority group members and women on this project shall be in accordance to the approved utilization plan for this project.

SAMPLE

CONTRACT SIGNATURE PAGE

PARKS certifies that copies of this signature page with original signatures will be attached to all other exact copies of the contract.

IN WITNESS WHEREOF, PARKS and the CONTRACTOR have executed this agreement on the date and year indicated.

NEW YORK STATE OFFICE OF PARKS,
RECREATION AND HISTORIC PRESERVATION

_____ By: _____
Date Bevin Collins
Title: Deputy Commissioner for Capital Programs

CONTRACTOR

_____ By: _____
Date (signature)

Name: _____
(print)

Title: _____
(print)

Federal ID Number: _____

Approved as to Form:

ATTORNEY GENERAL

By:_____

Date:_____

Thomas P. DiNapoli
State Comptroller

By: _____

Date: _____

- Contractor's signature must be notarized on the following page.

SAMPLE

CONTRACTOR'S SIGNATURE MUST BE NOTARIZED. USE EITHER THE INDIVIDUAL, PARTNERSHIP, OR CORPORATION FORM, AS APPROPRIATE

INDIVIDUAL

STATE OF NEW YORK)
) SS.:
COUNTY OF)

On this day of , 2021, before me personally came , to me known and known to me to be the person described in and who executed the foregoing instrument, and he or she acknowledged to me that he or she executed the same.

Notary Public

PARTNERSHIP

STATE OF NEW YORK)
) SS.:
COUNTY OF)

On this day of , 2021, before me personally came , to me known and known to me to be the person who executed the above instrument, who, being duly sworn by me did for himself or herself depose and say that he or she is a member of the firm of , consisting of himself or herself and , and that he or she executed the foregoing instrument in the firm name of , had authority to sign same, and did duly acknowledge to me that he or she executed the same as the act and deed of said firm for the uses and purposes mentioned therein.

Notary Public

CORPORATION

STATE OF NEW YORK)
) SS.:
COUNTY OF)

On this day of , 2021, before me personally came , to me known, who being by me duly sworn, did depose and say that he or she is the of , the corporation described in and which executed the foregoing instrument; that he or she has been duly authorized by the Board of Directors of said corporation to execute the foregoing instrument on behalf of said corporation and that he or she signed his or her name thereto by order of said corporation for the purposes and uses therein described.

Notary Public

SAMPLE

VENDOR RESPONSIBILITY QUESTIONNAIRE ACKNOWLEDGEMENT

Please check ***one*** of the following:

☐ A Vendor Responsibility Questionnaire has been filed online with the NYS Office of the State Comptroller and has been certified/update within the last six months.

☐ A Vendor Responsibility Questionnaire is attached

SFS Vendor ID# _____ EIN# _____

If online version used, please complete the following:

Vendor/Contractor:

_____

Contact Person:

_____

Name (Print) Title

Address:

_____

City: _____ State: _____ Zip Code: _____

Signature: _____

SAMPLE

Certification Under Executive Order No. 16
Prohibiting State Agencies and Authorities from Contracting with Businesses Conducting Business in Russia

Executive Order No. 16 provides that "all Affected State Entities are directed to refrain from entering into any new contract or renewing any existing contract with an entity conducting business operations in Russia." The complete text of Executive Order No. 16 can be found here.

The Executive Order remains in effect while sanctions imposed by the federal government are in effect. Accordingly, vendors who may be excluded from award because of current business operations in Russia are nevertheless encouraged to respond to solicitations to preserve their contracting opportunities in case the sanctions are lifted during a solicitation or even after award in the case of some solicitations.

As defined in Executive Order No. 16, an "entity conducting business operations in Russia" means an institution or company, wherever located, conducting any commercial activity in Russia or transacting business with the Russian Government or with commercial entities headquartered in Russia or with their principal place of business in Russia in the form of contracting, sales, purchasing, investment, or any business partnership.

Is Vendor an entity conducting business operations in Russia, as defined above? Please answer by checking one of the following boxes:

☐ 1. No, Vendor does not conduct business operations in Russia within the meaning of Executive Order No. 16.

☐ 2.a. Yes, Vendor conducts business operations in Russia within the meaning of Executive Order No. 16 but has taken steps to wind down business operations in Russia or is in the process of winding down business operations in Russia. (Please provide a detailed description of the wind down process and a schedule for completion.)

☐ 2.b. Yes, Vendor conducts business operations in Russia within the meaning of Executive Order No. 16 but only to the extent necessary to provide vital health and safety services within Russia or to comply with federal laws, regulations, executive orders, or directives. (Please provide a detailed description of the services being provided or the relevant laws, regulations, etc.)

☐ 3. Yes, Vendor conducts business operations in Russia within the meaning of Executive Order No. 16.

The undersigned certifies under penalties of perjury that they are knowledgeable about the Vendor's business and operations and that the answer provided herein is true to the best of their knowledge and belief.

Vendor Name: (legal entity) _____

By: (signature) _____

Name: _____

Title: _____

Date: _____

SAMPLE

Bid Confirmation

Contract

I have reviewed the bid submitted by _____ for the above referenced contract and have found no errors or omissions. _____ will perform the work as stated in the Contract Documents.

		If Applicable	
Base Bid:	$_____	Special Allowance:	$_____
Allowance:	$_____	Total Unit Price:	$_____
Total Bid:	$_____	Alternate(s):	$_____
			$_____
			$_____
			$_____
			$_____

In support of this, included is a copy of form OPR-102 : Itemized Breakdown of Bid.

_____ _____

Printed Name Company Position/Title

_____ _____

Signature Date

SAMPLE

NYS OPRHP Project No:	**(Project Number)**	Vendor Name:	**(Vendor)**	Date:	**(Date)**
Project Title:	**(Project Title)**	Office Manager:	**(Name)**		
Facility:	**(Facility)**	Estimator:	**(Name)**	Trade:	**GC/EC/MC/PC**
Street:	**(Street)**	E-mail:	**(E-mail)**	OPRHP D#:	**D#**
City, Zip, County:	**(City, State, Zip, County)**	Phone:	**(Phone)**	OPRHP PM:	**PARKS PM**
Project Type:	**(New/Rehab)**			OPRHP CMS:	**PARKS CMS**

CONSTRUCTION COST

FILL IN THE TAN SECTIONS ONLY (ROWS 77-87)

	Material	Labor	Total	$/GSF
01 - General Requirements / General Condition	$ -	$ -		
Subtotal General Requirements:	$ -	$ -	$ -	
02 - Existing Conditions	$ -	$ -		
03 - Concrete	$ -	$ -		
04 - Masonry	$ -	$ -		
05 - Metals	$ -	$ -		
06 - Wood, Plastics, and Composites	$ -	$ -		
07 - Thermal and Moisture Protection	$ -	$ -		
08 - Openings	$ -	$ -		
09 - Finishes	$ -	$ -		
10 - Specialties	$ -	$ -		
11 - Equipment	$ -	$ -		
12 - Furnishings	$ -	$ -		
13 - Special Construction	$ -	$ -		
14 - Conveying Equipment	$			
21 - Fire Suppression	$ -	$ -		
22 - Plumbing	$ -	$ -		
23 - HVAC	$ -	$		
25 - Integrated Automation	$ -	$		
26 - Electrical	$ -	$		
27 - Communications	$ -	$ -		
28 - Electronic Safety and Security	$ -	$ -		
31 - Earthwork	$ -	$ -		
32 - Exterior Improvements	$ -	$		
33 - Utilities	$ -	$ -		
34 - Transportation	$ -	$ -		
Other: 1	$ -	$ -		
Other: 2	$ -	$ -		
Subtotal:	$ -	$ -	$	
Construction Cost Subtotal:	$ -	$ -	$ -	

BID ALTERNATES (List Bid Alternates)

Alternate No.	Description	Amount
1	ALTERNATE 1 DESCRIPTION	$ -

Alternate No.	Description	Amount
2	ALTERNATE 2 DESCRIPTION	$ -

Alternate No.	Description	Amount
3	ALTERNATE 3 DESCRIPTION	$ -

Alternate No.	Description	Amount
4	ALTERNATE 4 DESCRIPTION	$ -

Construction Cost + Alternates (if applicable) Subtotal:	$ -

Administrative Costs	Percentage	Amount
General Conditions		$ -
Bonds (On Construction Cost)		$ -
Insurance (On Construction cost)		$ -
Overhead (On Construction Cost + Bonds + Insurance)		$ -
Profit (On Construction Cost + Bonds + Insurance)		$ -
		$ -
		$ -
		$ -
Total Administrative Costs		$ -

Allowance (provided in specification documents)

TOTAL COST ESTIMATE (AS BID)	**$ -**

SAMPLE

New York State
Parks, Recreation and
Historic Preservation

Summary of Subcontractors and Estimated Earnings

This form must be submitted with contract documentation for potential award and match the finalized Utilization Plan approved by OPRHP's Diversity Compliance Unit. Any subcontractor anticipated to make 100K or more on this contract must have a Vendor Responsibility questionnaire certified within the last six months.

Effective December 30, 2024 - ALL subcontractors must have a valid Department of Labor Public Work Registration ID before commencing work. It is the prime contractor's responsibility to confirm subcontractors performing work are in compliance with Labor Law Article 8 section 220-i and to provide copies of their subcontractors' registration certificates to the Capital Unit. Contractors and subcontractors who fail to comply with registration requirements or contractors, owners, or developers who knowingly allow unregistered contractors or subcontractors to commence work on a covered project may face a civil penalty up to $1,000 and the issuance of a stop work order.

Contract #	Contractor's Name	Date Prepared

Subcontractor's Name	DOL Public Work Registration #	Est. Amount Payable

SAMPLE

Legal name of Company

Preparer's Name

Phone Number

Title

E-mail Address

SUMMARY OF AND IMPLEMENTATION GUIDELINES FOR § 139-J OF THE STATE FINANCE LAW

* This summary is not intended to replace the need for persons to become familiar with the full requirements of the law. Please refer to the full text of the law to resolve any questions you may have with regard to your conduct under it.

Section 139-j of the State Finance Law imposes restrictions on the type of communications that a person may make to a governmental entity, such as the Office of Parks, Recreation and Historic Preservation (hereafter, referred as "OPRHP"), concerning a governmental procurement during a period of time which the law terms the "restricted period." These new requirements cover a wide range of government contracting transactions, including, the purchase of a commodity, service, technology, public work, construction and revenue contract, or the purchase, sale or lease of real property or the acquisition or the granting of other interests in real property (hereafter referred as "governmental procurement or procurement contract." Any person in the private sector (hereinafter referred to as "person") interested in contacting OPRHP concerning anyone of these types of transactions is covered under the provisions of the new law, which limits the way that such person can communicate with OPRHP during the "restricted period", which is defined broadly as the period of time commencing from the earliest written notice announcing a government procurement all the way until the award is approved by the comptroller.

For each governmental procurement OPRHP will designate an employee or employees that may be contacted by persons concerning all aspects of the governmental procurement. The law requires that each person that contacts (in writing, orally, or via email) OPRHP concerning a governmental procurement may only make what the law terms "permissible contacts", which means that the person: 1) shall contact only the designated person or persons identified by OPRHP in the governmental procurement documents and 2) shall not attempt to influence the procurement in a manner that would result in violation of §73(5) of the Public Officers Law (Ethical Prohibitions on Gifts to Public Officers and Employees) or in a manner that would result in violation of §74 of the Public Officers Law (The Code of Ethics).

The law specifically permits certain types of contacts by persons to OPRHP concerning the governmental procurement. These are:

- the submission of written proposals in response to a request for proposal, invitation for bids or any other method for soliciting a response from interested parties;
- the submission of written questions to a designated contact, when all written questions and responses are to be disseminated to all persons interested in such procurement;
- participation in a conference where all interested parties are invited to attend;

- written complaints made to the General Counsel's Office of OPRHP concerning the timely response to issues posed to the designated person, provided that such written complaints are made part of the procurement record;
- communications where the contract award has been tentatively made and where such communications are necessary to negotiate the terms of the procurement contract;
- requests made to the designated person or persons to review the procurement award;
- written protests, appeals, or other review proceedings to either OPRHP or an outside agency.

All communications which are reasonably inferred by OPRHP to be intended to influence the governmental procurement process or the award of such procurement in violation of the law will be recorded and made a part of the procurement record, whether such communications are made to the designated employee/s or another employee of OPRHP. Contacts made to persons other than the designated OPRHP employee shall also be deemed an impermissible contact.

Any contact which is alleged to be an impermissible contact under the law will be immediately referred to and investigated by OPRHP's Ethics Officer. The Ethics Officer shall promptly investigate the allegation by interviewing all employees reasonably involved or who are believed to have information about the impermissible contact. If sufficient cause exists to believe that such allegation is true, the person being investigated shall be given notice that an investigation is ongoing and such person shall be afforded an opportunity to be heard in response to the allegation either by responding in writing or by providing a statement before the Ethics Officer, who shall record by appropriate means such statement for the record. The Ethics Officer shall keep a record of the investigation and shall make a written finding of the results of such investigation and report these findings to the Commissioner.

In addition, a finding by the Ethics Officer that a person has knowingly and willingly violated the law by making an impermissible contact shall result in a determination of non-responsibility and such person and all associated subsidiaries of such person shall not be awarded the procurement contract. The determination of non-responsibility shall also be forwarded to the Commissioner of the Office of General Services (or his or her designee), which by law is required to keep a list of such determinations for public inspection. Determinations of non-responsibility must be disclosed in all future responses to New York State procurements. With few exceptions, no procurement contract shall be awarded to any person who fails to disclose findings of non-responsibility within the previous four years.

NEW YORK STATE OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION

GENERAL CONDITIONS

Table of Articles

1. The Contract Documents
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9. Permits and Compliance
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11. Change Orders
12. Site Conditions
13. Suspension of Work
14. Time of Completion and Termination for Cause
15. Termination for Contractor's Employment for the Convenience of the State of New York
16. Disputes
17. Statutory Requirements for the Utilization of Minority and Women Owned Business Enterprises
18. Subcontracts
19. Coordination of Separate Contracts (WICKS Projects)
20. Responsibility for Damage and Indemnification
21. Insurance
22. Occupancy Prior to Completion and Acceptance; Substantial Completion
23. Payment
24. Audits and Records
25. Labor Law and Prevailing Wages Notifications Provisions
26. Statutory Requirements for Restrictions on Contracts during the Procurement Process and Disclosure of Contacts and Responsibility of Offerors
27. Embodied Carbon Disclosures & Clean Concrete Requirements
28. Miscellaneous Provisions
29. Appendices

Appendices:

Appendix A - Standard Clauses for all New York State Contracts

Appendix B

Appendix C – Specific Insurance Coverages and Limits

ARTICLE 1 – THE CONTRACT DOCUMENTS

1.1 The Contract Documents are comprised of the following documents, all of which are hereby incorporated by reference and shall hereinafter be referenced as the "Contract."

- Appendix A - Standard Clauses For New York State Contracts;
- Agreement;
- General Conditions;
- Supplemental Conditions;
- Appendix B;
- Appendix C – Specific Insurance Coverages and Limits;
- Specifications;
- Drawings;
- Instructions to Bidders;
- Performance and Payment Bond;
- Labor and Materials Bond;
- All Required Certificates of Insurance;
- All Addenda issued prior to the receipt of bids;
- An Approved MWBE Utilization Plan, if required;

1.2 The Contract Documents form the Contract. The Contract represents the entire and integrated agreement between the parties and supersedes all prior negotiations, representations and agreements, either written or oral, including Bidding Documents.

1.3 The Contract may not be modified except in accordance with the General Conditions.

ARTICLE 2 – DEFINED TERMS

2.1 The following terms shall have the meanings ascribed to them in this Article, wherever they appear in the Contract Documents.

2.2 The term "Bid" means the approved prepared bid form on which the Bidder is to submit or has submitted a bid for the Project contemplated.

2.3 The term "Bidder" means any individual, firm or corporation submitting a Bid for the Project contemplated, acting directly or through a duly authorized representative.

2.4 The term "Bid Security" means the collateral in the form of a certified check, bank check or bid bond to be furnished by the Bidder as a guarantee of his or her ability to procure the minimum equipment and liquid assets specified and that Bidder shall enter into a Contract with the Office for the performance of the Work.

2.5 The term "Certificate of Acceptance" means the certificate prepared by the Director's Representative evidencing the Work is physically completed and setting forth the Physical Completion Date.

2.6 The term “Certificate of Substantial Completion” means the certificate prepared by the Director’s Representative evidencing that the Work is substantially completed and setting forth the date of Substantial Completion.

2.7 The term “Change Order” means a written order to the Contractor signed by the Contractor, Director’s Representative, and NYS Office of State Comptroller, issued after the execution of the Contract, authorizing a Change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order.

2.8 The term “Commissioner” means the Commissioner of Parks, Recreation and Historic Preservation.

2.9 The term “Comptroller” means the Comptroller of the State of New York.

2.10 The term “Contractor” means the person, firm, partnership or corporation executing the Contract or the successor or assignee of the Contractor approved in writing by the Commissioner.

2.11 The term “Days” shall mean calendar days.

2.12 The term “Designated Payment Office” shall be the regional office as identified on the cover of the Project Manual.

2.13 The term “Director” means the Director of Capital Programs or equivalent for the Office of Parks, Recreation and Historic Preservation, who will have general direction and supervision of the Work, except for Appendix B where the term “Director” means the Director of the Division on Minority and Women’s Business Development.

2.14 The “Director’s Representative” means an employee of the Office designated by the Director as the Director’s authorized representative. Under the direction of the Director, the Representative shall have complete charge of the Work and shall exercise full supervision and direction of the Work. Except where noted, the Contract Documents specifically designate a person to perform a function or duty, it shall mean the Director’s Representative but only for the performance of that function or duty. Where the word “directed” appears in the Contract Documents, the words “by the Director’s Representative” shall be deemed inserted thereafter in each case except where it is obviously inappropriate in context.

2.15 The term “Environmental Product Declaration” or “EPD” is a standardized, third-party verified report that quantifies environmental information over the life cycle of a product to enable comparisons of environmental impact between products fulfilling the same function. An EPD is required for certain construction materials and concrete mixes under Article 27 of this Contract.

2.16 The term “Labor and Materials Bond” is a bond guaranteeing prompt payment of monies due to all persons furnishing labor or materials to the Contractor or any Subcontractor in the prosecution of the Work provided for as set forth in State Finance Law Section 137.

2.17 The term “Liquidated Damages” means the total amount of money to be assessed against the Contractor for delay in completion of the Contract. The total amount of such damages shall not exceed the amount per day stipulated in Article 14.10 times the numbers of Days completion is delayed, unless otherwise specified in the Notice to Bidders.

2.18 The term “Material” means any approved material acceptable to the Director’s Representative and conforming to the requirements of the Specifications. All processes and materials shall at all times be open to inspection and testing by the Office and its authorized representatives.

2.19 The term “Offerer” shall mean the individual or entity, or any employee, agent of consultant or person acting on behalf of such individual or entity that contacts a governmental entity about a governmental procurement during the restricted period of such governmental procurement.

2.20 The term “Office” or “OPRHP” means the New York State Office of Parks, Recreation and Historic Preservation.

2.21 The term “Performance Bond” means a written guaranty from a third party guarantor provided to the Office by Contractor upon the award of the Contract to ensure the full performance of the Work and completion of the Project as set forth in the Contract Documents. The form of the Performance Bond is subject to the approval of the Office and the Attorney General.

2.22 The term “Physical Completion Date” means the date upon which Director’s Representative deems that all deficiencies noted on the Punch List have been corrected or completed as evidenced by the issuance of the Certificate of Acceptance.

2.23 The term “Plan” or “Drawings” means an illustrated graphic that typically includes technical layout information, specification data, and details as required to facilitate the construction of an entire project or smaller unit of work.

2.24 The term “Premises” means all land, buildings, structures, or other items of any kind located around or adjacent to the Site and owned, occupied or otherwise used by the State.

2.25 The term “Project” means Work at the site carried out pursuant to one or more sets of Contract Documents.

2.26 The term “Project Manual” means the combined Notice to Bidders, Instructions to Bidders, Supplementary Conditions, the Summary of and Implementation Guidelines for § 139-J of the State Finance Law, Sample Forms, Bid Forms, General Conditions, All Referenced Appendices, Prevailing Wage Rates, the Drawings and Specifications; the Invitation for Bids and the Bid, issued prior to the receipt of bids.

2.27 The term “Provide” means to furnish and install, complete, in place and ready for operation and use.

2.28 The term “Punch List” means a document that is attached to the Certificate of Substantial Completion prepared by the Director’s Representative or their designee listing work that does not conform to the Contract Documents that the Contractor must complete or correct after Substantial Completion, but before the Physical Completion Date and final payment.

2.29 The term “Samples” are physical examples submitted by the Contractor of materials, equipment or workmanship to establish a standard, which the Contractor is required to meet.

2.30 The term “Schedule of Values” means a breakdown of the Contract Sum in tabular form that lists the dollar value of individual work items. Schedule to be provided in accordance with specific Division 01 requirements and in enough detail to facilitate evaluation of the Payment Application by the Director’s Representative.

2.31 The term “Shop Drawings” are drawings, diagrams, illustrations, schedules, test data, performance charts, cuts, brochures and other data which are prepared by the Contractor or any Subcontractor, manufacturer, supplier or distributor, and submitted by the Contractor and which illustrate a portion of the Work.

2.32 The term “Site” means the area within the contract limit lines as identified in the drawings, or adjacent areas designated in writing by the Director’s Representative. Some contracts might involve separate and distinct sites.

2.33 The term “Specifications” means the body of directions and/or requirements contained in this document, together with all documents of any description, and agreements made (or to be made), pertaining to the methods (or manner), of performing the work and quality (as shown by test records) of accepted materials to be furnished under this Contract.

2.34 The term “State” means the State of New York.

2.35 The term “Subcontractor” means a person, firm, partnership or corporation executing a portion of the Work for the “Contractor,” who has the sole responsibility for his or her performance.

2.36 The term “Substantial Completion” means that the Work is sufficiently completed in the sole discretion of the Director’s Representative in accordance with the the Contract, so that OPRHP may occupy or use the Work for its intended purpose without unscheduled interruption caused by the needed completion of any remaining or unfinished work, as evidenced by the issuance of a Certificate of Substantial Completion. The terms “Substantially Complete” and “Substantially Completed” as applied to the work refer to Substantial Completion of the Work.

2.37 The term “Surety” means the entity which is bound with and for the Contractor, and which is engaged to be responsible for the Contractor’s acceptable performance of the Project for which he or she has contracted and for all Labor, Performance, and Material Bonds.

2.38 The term “Work” means the total sum of labor, supervision, materials and equipment necessary for the proper completion of the Contract as set forth in the Contract Documents.

ARTICLE 3 – INTERPRETATION OF CONTRACT DOCUMENTS

The Plans, Drawings and Specifications are complementary, and what is called for by one shall be as binding as if called for by all. It is not intended to include work not properly inferable from the Plans, Drawings and Specifications. In all cases, labelled dimensions shall take precedence over scaled dimensions, and the larger scale details take precedence over smaller scale drawings. In the case of difference between Drawings and Specifications, the Specifications shall govern.

3.1 Upon his or her own initiative or the Contractor's written request, the Director's Representative may issue written interpretation or drawings necessary for the proper execution or progress of the work which interpretation shall be consistent with and reasonably inferable from the Contract Documents.

3.2 The language of the Contract Documents is directed at the Contractor unless specifically stated otherwise.

3.3 The organization of the Specifications into divisions, sections and articles, and the arrangement of Drawings shall not control the Contractor in dividing the Work among subcontractors or in establishing the extent of Work to be performed by any trade.

3.4 In the event of conflicting provisions in the Contract Documents, the Specifications shall take precedence over the Drawings.

3.5 If during the performance of the Work, the Contractor identifies a conflict in the Contract Documents, or a variation from any applicable statute, rule or regulation, the Contractor shall promptly notify the Director’s Representative in writing of the conflict. The Director’s Representative shall promptly acknowledge the notification in writing and advise the Contractor, pursuant to Paragraph 3.2 of these General Conditions, as to the interpretation to be followed in the performance of the Work.

ARTICLE 4 – SHOP DRAWINGS AND OTHER SUBMITTALS

4.1 Shop Drawings (see Article 2.28)

4.2 Product data are manufacturer's catalogsheets, brochures, standard diagrams, illustrations, schedules, performance charts, test data, standard schematic drawings, specifications and installation instructions.

4.3 Samples are physical examples submitted by the Contractor of materials, equipment or workmanship to establish a standard that the Contractor is required to meet.

4.4 The Contractor and the Director's Representative shall adhere to the submittal and scheduling requirements for Shop Drawings, product data and Samples set out in the Specifications.

4.5 By approving and submitting Shop Drawings and samples, the Contractor represents that the Contractor has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data and that he or she has checked and coordinated each Shop Drawing and Sample with the requirements of the Contract Documents.

4.6 The Director's Representative's approval of Shop Drawings, product data and Samples shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has previously informed the Director's Representative of the deviation in a separate writing at the time of submission and received written approval for the specific deviations. The Director's Representative's approval shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings, product data or samples.

4.7 No portion of the Work requiring Shop Drawings, product data or Sample submission shall be commenced until the appropriate submission has been approved by the Director's Representative.

4.8 Any portions of the Work requiring Shop Drawings, product data and Samples shall be installed in accordance with the approved Shop Drawings, product data and Samples.

ARTICLE 5 – SCHEDULE

5.1 Each Contractor shall deliver to the Director's Representative and receive approval prior to commencing work, a detailed schedule concerning his or her operations upon the Project on a form acceptable to the Office, which shall indicate completion within the specified time frame, to the satisfaction of the Director'sRepresentative.

5.2 During the term of this Agreement, the Director's Representative may require any Contractor to modify any schedules which he or she has submitted either before or after they are approved so that:

(a) The Work or the Project may be properly progressed.

(b) Changes in the Work or the Work of other Contractors are properly reflected in these schedules.

ARTICLE 6 - MATERIALS

6.1 All materials, equipment and articles used permanently in the Work that become the property of the State shall be new unless specifically stated otherwise in the Contract.

6.2 Except where specifically provided otherwise, whenever any product is specified by the name, trade name, make, model or catalog number of any manufacturer or supplier, the intent is not to limit competition, but to establish a standard of quality that the Director's Representative has determined is necessary. The words "or equal" shall be deemed inserted in each instance. The Contractor may use any product equal to that named in the Contract Documents that is approved by the Director's Representative and which meets the requirements of the Contract Documents provided the Contractor gives timely notice of his or her intent in accordance with the submittal and scheduling requirements.

6.3 The Contractor shall have the burden of proving at the Contractor's own cost and expense to the satisfaction of the Director's Representative that the proposed product is equal tothe named product. The Director's Representative may establish criteria for product approval. The Director's Representative shall determine in his or her absolute discretion whether a proposed product is to be approved.

6.4 If the Contractor fails to comply with the provisions of this Article, or if the Director's Representative determines that the proposed product is not equal to that named, the Contractor shall supply the product named.

6.5 The Contractor shall have and make no claim for the extension of time or for damages because the Director's Representative requires a reasonable period of time to consider a product proposed by the Contractor or because the Director's Representative disapproves such a product.

6.6 Where optional materials or methods are specified, or where "or equal" submissions are approved, the Contractor shall make all adjustments to contingent work, whether the contingent work be the Work of its contract or the Work of another Contract, necessary to accommodate the option or "or equal" product it selects without extra or additional cost.

6.7 The Contractor shall within 48 hours remove from the Premises all materials rejected by the Director's Representative as failing to conform to the Contract, whether incorporated in the Work or not, and the Contractor shall promptly substitute satisfactory materials in accordance with the Contract and without expense to the Office. In addition, the Contractor shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

6.8 Royalties and patents: The Contractor shall pay all royalties and license fees. The Contractor shall defend all suits or claims for infringement of any patent rights and shall defend, indemnify and save the State harmless from loss on account thereof, except that the State shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified.

6.9 Asbestos Free Materials: All materials used for construction shall be free of asbestos containing materials. If asbestos is found in installed products not previously approved by the State, then it will be the responsibility of the contractor to abate the asbestos containing material and replace the work with new asbestos free materials at no cost to the State.

6.10 The contractor agrees that if the value of this contract exceeds $100,000 all structural steel,

reinforcing steel and other major steel items to be incorporate in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

ARTICLE 7 – CONTRACTOR'S SUPERVISION

7.1 The Contractor shall designate a competent supervisor for the Work to represent the Contractor at the site at all times with authority to act for the Contractor ("Contractor's Representative"). The Contractor shall notify the Director's Representative in writing of the identity of the Contractor's Representative prior to the commencement of the Work. All directions given the Contractor's Representative shall be as binding as if given to the Contractor.

7.2 Should the Director's Representative deem any employee of the Contractor incompetent or negligent or for any cause unfit for his or her duty, the Contractor shall dismiss such employee and he or she shall not again be employed on the Work.

7.3 The Contractor's use of any Subcontractor shall not diminish the Contractor's obligations to complete the Work in accordance with the Contract. The Contractor shall control and coordinate the Work of its Subcontractors.

7.4 The Contractor shall be responsible for informing its Subcontractors and suppliers of all the terms, conditions and requirements of the Contract Documents including, but not limited to the General Conditions, Supplemental Conditions, the Drawings and Specifications, Appendix A, and changes made by Addenda.

ARTICLE 8 – USE OF PREMISES

8.1 If the Premises are occupied, the Contractor, the Contractor's Subcontractors and their employees shall comply with the regulations governing access to, operation of, and conduct while in or on the Premises and shall perform the Work in such a manner as not to unreasonably interrupt or interfere with the conduct of business.

8.2 The Contractor, the Contractor's Subcontractors and their employees shall not have access to or be admitted into any area of the Premises outside the Site except with the written permission of the Director's Representative.

ARTICLE 9 – PERMITS AND COMPLIANCE WITH APPLICABLE LAWS

9.1 The Contractor shall obtain, maintain and pay for all permits and licenses legally required and shall give all notices, pay all fees, and comply with all laws, rules and regulations applicable to the Work at no additional cost.

9.2 Contractor shall comply with all federal and state laws, codes and regulations applicable to the conduct of the activities authorized by this Contract.

9.3 If, in carrying out this Work, a harmful dust hazard is created for which appliances or methods for the elimination of harmful dust have been approved by the Industrial Board of

Appeals, then the Contractor shall install, maintain and effectively operate such appliances and methods during the life of this Contract; and in case of Contractor's failure to comply, as provided by Section 222-a of the Labor Law, the Contract shall be void.

9.4 In accordance with Worker's Compensation Law (WCL) §141-b (Suspension and Debarment), any person subject to a final assessment of civil fines or penalties or a stop-work order, or that has been convicted of a misdemeanor for a violation of WCL §§ 26 (Enforcement of Payment in Default), 52 (Effect of Failure to Secure Compensation) or 131 (Payroll Records), and any substantially-owned affiliated entity of such person, shall be ineligible to submit a bid on or be awarded any such public work contract or subcontract with the State, any municipal corporation or public body for a period of one (1) year from the final determination or conviction. Any person convicted of a felony under Article 8 (Administration) of the WCL, or a misdemeanor under WCL §§125 (Job Description Prohibited Based on Prior Receipt of Benefits) and 125-a (Civil Enforcement) shall be ineligible to submit a bid or be awarded any public work contract or subcontract with the State, any municipal corporation or public body for a period of five (5) years from such conviction.

9.5 The Contractor certifies and warrants that all heavy-duty vehicles, as defined in New York State Environmental Conservation Law (ECL) section 19-0323, to be used under this Contract will comply with the specifications and provisions of ECL section 19-0323, as well as any regulations promulgated pursuant thereto, including NYCRR Part 248; which, requires the use of Best Available Retrofit Technology (BART) and Ultra-Low Sulfur Diesel (ULSD) fuel.

9.6 During the term of this Contract, the Contractor agrees to report any observed or suspected illegal activity of its employees, agents or other third parties, to the assigned Director's Representative, OPRHP Director of Capital Programs,OPRHP Counsel's Office, the State Inspector General or other law enforcement agency. Failure to report criminal conduct associated with a contract awarded by the Office, shall be considered a material breach of this Contract and may provide grounds for disqualification of the subject Contractor or Subcontractor for award of future contracts. The Contractor shall include the provisions of this section in every subcontract, in such a manner that the provisions will be binding upon each Subcontractor as to work performed in connection with this Contract.

ARTICLE 10 – INSPECTION AND MATERIAL ACCEPTANCE

10.1 The Director's Representative will inspect and test the Work at reasonable times at the Site, unless the Director's Representative determines to make an inspection or test at the place of production, manufacture or shipment. Such inspection or test shall be conclusive as to whether the material and workmanship inspected or tested conforms to the requirements of the Contract. Such inspection or test shall not relieve the Contractor of responsibility for damage to or loss of the material prior to acceptance. Conducting inspections or tests shall not diminish the Director's Representative the right to reject the completed Work.

10.2 The Contractor shall, without charge, promptly correct any Work the Director's Representative determines does not conform to the Contract Documents unless in the public interest the Director's Representative consents to accept such Work with an appropriate adjustment in the Contract price. The Contractor shall promptly remove rejected material from the Premises.

10.3 If the Contractor does not promptly correct rejected Work including the Work of another contractor or Subcontractor destroyed or damaged by removal, replacement, or correction, the Director's Representative may (1) correct such Work and charge the cost thereof to the Contractor; or (2) terminate the Contract in accordance with Article 15 of General Conditions.

10.4 The Contractor shall furnish promptly, without additional charge, all facilities, labor, material and equipment reasonably needed to perform in a safe and convenient manner such inspections and tests, as the Director's Representative requires.

10.5 The Contractor shall keep the Director's Representative informed of the progress of the Work and particularly when the Contractor intends to cover Work not yet inspected or tested. All inspection and tests by the Director's Representative shall be performed in such manner as not to unreasonably delay the Work. The Contractor shall be charged with any additional cost of inspection when the Work is not ready at the time specified by the Director's Representative for inspection.

10.6 Should the Director's Representative determine at any time before acceptance of the entire Work to examine Work already completed by removing, uncovering or testing the same, the Contractor shall, on request, promptly furnish all necessary facilities, labor, materials and equipment to conduct such inspection, examination or test. If such Work is found to be defective or nonconforming in any material respect, the Contractor shall defray all the expenses of such examination and satisfactory reconstruction. If the Work is found to meet the requirements of the Contract Documents, the Director's Representative shall compensate the Contractor for additional services involved in such examination and reconstruction. If completion of the Work has been delayed, the contractor may request a suitable extension of time.

10.7 No previous inspection or certificates of payment shall relieve the Contractor from the obligation to perform the Work in accordance with the Contract Documents.

10.8 The Contractor shall remedy all defects and pay for the cost of any damage to other Work resulting therefrom, notice of which shall have been provided within a period of one year from the Physical Completion Date in accordance with the General Conditions.

ARTICLE 11 – CHANGE ORDERS

11.1 The Office may make changes by altering, adding to or deducting from the Work, and adjusting the Contract price accordingly. All changes Work shall be executed in

conformity with the terms and conditions of the Contract Documents unless otherwise provided in the Order on Contract. Any change in the Contract sum or time for completion shall be adjusted prior to issuing the Order on Contract.

11.2 No written or oral instructions shall be construed as directing a change in the Work unless in the form of an Order of Contract signed by the Office and the Contractor and signed by the NYS Office of State Comptroller. The Order of Contract shall describe or enumerate the Work to be performed and state the price to be added to or deducted from the Contract sum. If the extent or cost of the Work is not determinable until after the changed Work is performed, the Order on Contact shall specify the method for determining the cost and extent of the changed Work when completed. If the Contractor disagrees as to any element of the Order on Contract, the Contractor shall indicate the disagreement in writing on the face of the Order on Contract and promptly proceed in accordance with the Order on Contract.

11.3 If the Contractor is directed to perform Work for which the Contractor believes he or she is entitled to an Order of Contract, the Contractor shall give the Director prompt written notice and await instructions before proceeding to execute such Work. The Director may order the Contractor to execute the Work and proceed under the Disputes Clause.

11.4 The value of any Order of Contract shall be determined by one or more of the following methods:

(a) By acceptance of prices negotiated or established based on estimated cost plus overhead and profit as applicable.

(b) By Prices specifically named in the Specifications or Bid Form.

(c) By acceptance of agreed unit prices based on estimated cost plus overhead and profit as applicable.

(d) By estimate of the actual cost of labor and materials plus overhead and profit, cost to be determined as the work progresses.

(e) By actual cost of labor and materials plus overhead and profit, cost to be determined as the work progresses.

(f) By estimate of the value as deducible from the approved detailed estimate.

11.5 Overhead shall be defined as an allowance to compensate for all costs, charges and expenses, direct or indirect, except for the actual cost of labor and materials as defined by paragraph 11.6. Overhead shall be considered to include, but not limited to insurance (other than as mentioned in paragraph 11.6) bond or bonds, field and office supervisors and assistants above the level of foreman, use of small tools and minor equipment, incidental job burdens, general office expenses, etc.

11.6 Actual cost of labor and material shall be defined as the amount paid for the following costs, to the extent determined reasonable and necessary:

(a) Cost of materials delivered to the job site for incorporation into the Contract Work. The value of any material removed and disposed of by the Contractor shall be a credit to the Office.

(b) Wages paid to workers and foreman and wage supplements paid to labor organizations in accordance with current labor agreements.

(c) Premiums or taxes paid by the Contractor for Worker's compensation insurance, unemployment insurance, FICA tax and other payroll taxes as required by law, net of actual and anticipated refunds and rebates.

(d) Sales taxes paid as required by law.

(e) Allowance for use of construction equipment (exclusive of hand tools and minor equipment), as approved for use by the Director's Representative.

i. Rented equipment will be paid for at the actual rental cost.

ii. Gasoline, oil and grease required for operation and maintenance will be paid for at the actual cost.

iii. When, in the opinion of the Contractor, and as approved by the Director's Representative, suitable equipment is not available on the site, the moving of said equipment to and from the site will be paid for at actual cost.

iv. Self-owned equipment, including equipment rented from controlled or affiliated companies. The rate on self-owned equipment used for periods of under five days will be an hourly rate established by taking any published rate which is mutually acceptable to the Contractor and the Director's Representative and determining an hourly rate on the basis of 22 days per month and eight hours per day. Equipment used for periods of five days or more will be billed at a rate equal to 45% of the monthly rate. In the alternative, the Director's Representative may approve for reimbursement a rate representing the allocable costs of ownership.

11.7 Regardless of the method used to determine the value of any Order of Contract, the Contractor will be required to submit evidence satisfactory to the Director to substantiate each and every item that constitutes his or her proposal of the value of the change. The amounts allowed for overhead and profit shall not exceed the applicable percentages as established in the two following paragraphs.

11.8 If the work is done directly by the Contractor, overhead in an amount of 10% may be added

if method (a), (c), (d) or (e) is used, and to the cost of the labor and materials plus overhead there may be added 10% for profit. The percentages for overhead and profit may vary accordingly to the nature, extent and complexity of the Work involved, but in no case shall exceed the percentages set forth in this paragraph and in paragraph 11.9. No percentages for overhead and profit will be allowed on payroll taxes or on the premium portion of overhead pay.

11.9 If the Work is done by a subcontractor, subcontractor's overhead in the amount of 5% may be added to the cost of labor and materials if method (a), (c), (d), and (e) is used and to the cost of labor and materials plus overhead there may be added 10% for the subcontractor's profit. No percentage for overhead and profit will be allowed on payroll taxes or on the premium portion of overtime pay. However, to the extent that the aggregate dollar value of Orders on Contract exceeds $75,000, the 10% overhead applied to total costs of labor and materials incurred by the prime Contractor shall be reduced to 5%. In addition, on all individual Orders of Contract in excess of $75,000, the overhead shall be no more than 5% of the total actual cost of labor and materials incurred by the Contractor, and the combined Contractor's overhead and profit allowance applied to subcontract billings shall be no more than 5%.

11.10 The Director shall determine by which of the foregoing methods of value of any changes shall be computed.

11.11 In computing the value of an Order on Contract which involved additions and deductions of Work and the added Work exceeds the omitted Work, overhead and profit shall be computed on the amount by which the cost of additional labor material exceeds the cost of the omitted labor and material, except no additional overhead and profit shall be allowed on value of work determined by method (b) or (f).

11.12 In computing the value of an Order of Contract which involves deductions and additions of Work and the omitted work exceeds the added Work, the Contractor will be allowed to retain the overhead and profit on the amount by which the omitted Work exceeds the added Work, except that no overhead and profit shall be retained on value of Work determined by method (b) or (f).

11.13 The Contractor may retain overhead and profit on an Order of Contract which involved deductions only, except that no overhead and profit shall be considered on value of Work determined by method (b) or (f).

ARTICLE 12 – SITE CONDITIONS

12.1 If the Contractor encounters subsurface or other latent physical conditions at the Site which differ substantially from those shown, described or indicated in such information provided in the Contract Documents or from any information which is a public record and which subsurface or other latent physical condition could not have been reasonably anticipated from that information or from the Contractor's own inspection and

examination of the Site, the Contractor shall give immediate written notice to the Director's Representative before any such condition is disturbed. The Director's Representative shall promptly investigate and, if it is determined that the conditions substantially differ from those that should have been reasonably anticipated, shall make such changes in the Contract Documents as may be required. If necessary, the Contract sum and completion date shall be adjusted by Change Order, to reflect any increase or decrease in the cost of, or time required for, performance of the Contract.

12.2 The Contractor shall protect trees, shrubbery and other natural features or structures within the Premises from being cut, trimmed, or injured, unless directed by the Director's Representative for preparing the Site for the Work. The Contractor shall prevent employees from tramping in the shrubbery and vehicles from being driven through wooded lands. When necessary, the Contractor shall protect trees adjacent to the premises in a matter satisfactory to the Director's Representative.

12.3 The Contractor shall provide and replant at its own expense trees, shrubbery, and other natural features destroyed or damaged. The Contractor shall conduct its operations within the Premises as directed by the Director's Representative.

ARTICLE 13 – SUSPENSION OF WORK

13.1 Suspension of Work: The Director may order the Contractor in writing to suspend, delay, or interrupt performance of all or any part of the Work for a reasonable period of time as the Director, in his or her sole discretion, may determine ("Suspension Order"). The order shall contain the reason or reasons for issuance that may include but shall not be limited to the following: latent field conditions, substantial program revisions, civil unrest, acts of God.

(a) Upon receipt of a Suspension Order, the Contractor shall, as soon as practicable, cease performance of the Work as ordered and take immediate affirmative measures to protect such Work from loss or damage.

(b) The Contractor specifically agrees that a suspension, interruption or delay of the performance of the Work pursuant to this Article shall not increase the cost of performance of the Work of this Contract.

(c) A Suspension Order issued by the Director pursuant to this Article shall have duration not to exceed 30 days. If the Contractor is not directed to resume performance of the Work affected by said Suspension Order prior to the expiration of 30 days, the Contract may be terminated for the convenience of the State and the Contractor shall be reimbursed as provided by Article 15.

13.2 Stop Work Orders: If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents,

the Director's Representative may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Director's Representative to stop the Work shall not give rise to any duty on the part of the Director's Representative to exercise this right for the benefit of Contractor or any other party.

(a) Contractor shall bear all direct, indirect and consequential costs of such order to Contractor to stop Work including but not limited to fees and charges of engineers, architects, attorneys and other professionals, any additional expenses incurred by the Office due to delays to others performing work under a separate contract with the Director's Representative, and other contractual obligations, and Contractor shall further bear the responsibility for maintaining schedule and shall not be entitled to any extension of contract time or recovery of any delay damages due to the order to stop Work.

(b) In the event that Contractor fails to pay such costs within thirty days after receipt of an invoice from Office, a Change Order or proposed Change Order may be issued incorporating the unpaid amount as an appropriate reduction in the Contract Price. If the parties are unable to agree as to the amount thereof, the Contractor may make a claim therefore as provided in Article 11 of the General Conditions.

ARTICLE 14 – TIME OF COMPLETION AND TERMINATION FOR CAUSE

14.1 All time limits set forth in this Contract are of the Essence. Failure by the Contractor to meet with the Contract deadlines shall be cause for the Office to assess Liquidated Damages.

14.2 Termination for Cause. In addition to all other rights of termination provided by law and in this Contract, if any one or more of the following events shall occur, that is to say.

(a) If Contractor commences a voluntary case under any chapter of the Bankruptcy Code, as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time relating to the bankruptcy or insolvency;

(b) If a petition is filed against Contractor under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any other federal or state law in effect at the time relating to bankruptcy or insolvency;

(c) If Contractor makes a general assignment for the benefit of creditors;

(d) If a trustee, receiver, custodian or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors;

(e) If Contractor admits in writing an inability to pay its debts generally as they become due;

(f) If Contractor fails to perform the Work in accordance with the Contract documents, including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the progress scheduled established under Article 5.1, as revised from time to time, or failure to submit an updated schedule as required by Article 5.2;

(g) If Contractor disregards the authority of the Director's Representative;

(h) If Contractor filed certification in accordance with New York State Finance Law § 139-k and such certification was intentionally false or intentionally incomplete.

14.3 If in the judgment of the Director, the Contractor fails or refuses to prosecute the Work in accordance with the Contract, or fails to complete the Work within the time provided by the Contract, the Director may terminate the Contract by written notice to the Contractor in the manner set forth in Article 28.2 herein and to the Surety in the manner set forth in the Performance Bond. In such event, the Director shall direct the Surety to complete the Work. If the Surety fails or refuses to complete the Work, the Director may take over the Work and prosecute it to completion by contract publicly let or otherwise and may take possession of and utilize in completing the Work, such of the Contractor's materials, equipment and plant as may be on the Site of the Work. Whether or not the right to terminate is exercised, the Contractor and the Surety shall be liable for any damage to the State resulting from the Contractor's failure or refusal to complete the Work in accordance with the Contract or his or her failure to complete the Work within the time provided by the Contract.

14.4 If the Director terminates the Contract for failure to prosecute the Work, in addition to any damages provided for by law, the delay shall occasion the payment of damages by Contractor which shall consist of Liquidated Damages until the Work is physically completed, plus any increased costs the Office incurs in completing the Work.

14.5 The Contract shall not be so terminated, nor the Contractor charged with resulting damage if:

(a) The delay in the completion of the Work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor including, but not restricted to, acts of God, acts of the public enemy, acts of another Contractor in the performance of a contract with the Office, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather, or delays of subcontractors or suppliers arising from unforeseeable causes beyond the control

and without the fault or negligence of both the Contractor and such subcontractors or suppliers; and

(b) The Contractor shall notify the Director's Representative in writing of the causes of delay within fifteen (15) days from when the Contractor knew or ought to have known of any such delay.

14.6 The Director's Representative will ascertain the facts and the extent of the delay and extend the time for completing the Work when, in the Director's Representative's judgment, the findings of fact justify such an extension, and his or her findings of fact shall be final and conclusive unless within twenty (20) Days from the date of receipt of the decision, the Contractor serves upon the Director a written appeal by certified mail. Upon appeal, the decision of the Director shall be final and conclusive.

14.7 If after notice of termination of the Contract, it is determined for any reason that the Contractor was not in default or that the delay was excusable, the rights and obligations of the parties shall be the same as if the notice of termination had been issued pursuant to the termination for convenience clause.

14.8 The rights and remedies of the Office provided in this clause are in addition to any other rights and remedies provided by law or under this Contract, provided that damages for delay incurred by the Contractor shall be as specified in Articles 14.3 and 14.4.

14.9 The Office reserves the right to terminate this Contract in the event it is found that the certification filed by the Contractor in accordance with New York State Finance Law §139-k was intentionally false or intentionally incomplete. Upon such finding, the Office may exercise its termination right by providing written notification to the Contractor in accordance with the written notification terms of the Contract.

14.10 Liquidated Damages: The work represented in this Contract is part of a comprehensive program, undertaken by the Office on behalf of the People of the State of New York in the belief that the expenditures are justified by the benefits which accrue to the public. If the public does not get the full and complete use of facilities for which the expenditures are made, a resulting financial loss cannot be exactly computed. Accordingly, a deduction, indicated below or in the Notice to Bidders, will be made from the Contract price for every calendar day after the completion date specified in the Contract Documents for which the Contract is not completed in every detail. Said sum, because of the difficulty in determining accurately the loss to the State, is hereby fixed and agreed as the Liquidated Damages that the State will suffer by reason of such delay, and not as a penalty; such Liquidated Damages, as defined for this Project, are understood and agreed to be the actual cost of all extra inspection, salaries of contingent force, and other engineering expenses entailed upon the State as a result of such delay. The Liquidated Damages set forth herein apply only to a delay in completion of the Project and in no way are such damages to be interpreted as being the Office's exclusive remedy under the Contract or in Law.

SCHEDULE OF LIQUIDATED DAMAGES		
Original Total Contract Bid Price		Liquidated Damages per Calendar Day
From More Than	**To and Including**	
$0	$100,000	$500
$100,000	$500,000	$1,000
$500,000	$1,000,000	$1,500
$1,000,000	$2,000,000	$1,750
$2,000,000	$5,000,000	$2,000
$5,000,000	$10,000,000	$2,500
$10,000,000	$20,000,000	$4,000
$20,000,000		$7,000

14.11 Contractor Responsibility:

(a) Contractor shall at all times during the contract term remain a responsible vendor. Contractor agrees, if requested by OPRHP, to present evidence of its continuing legal authority to do business in New York State, its integrity, experience, ability, prior performance and organizational and financial capacity to carry out the terms of this contract.

(b) OPRHP reserves the right to suspend any or all activities under this contract, at any time, when OPRHP discovers information that calls into question the responsibility of Contractor. In the event of such suspension, Contractor will be given written notice outlining the particulars of such suspension. Upon issuance of such notice, Contractor must comply with the terms of the suspension order. Contractual activities may resume at such time as OPRHP issues a written notice authorizing resumption of contractual activities.

(c) Notwithstanding the provision of Article 14 of the contract pertaining to Termination and Revocation, upon written notice to Contractor and a reasonable opportunity to be heard with appropriate OPRHP staff, this contract may be terminated by OPRHP at Contractor's expense where Contractor is determined by OPRHP to be non-responsible. In such event, OPRHP may pursue available legal or equitable remedies for breach.

ARTICLE 15 – TERMINATION OF CONTRACTOR'S EMPLOYMENT FOR THE CONVENIENCE OF THE STATE OF NEW YORK

15.1 The Director may terminate this Contract whenever in the Director's judgment the public interest so requires by delivering to the Contractor a notice of termination specifying the extent to which performance of Work under the Contract is terminated and the date upon which such termination becomes effective. Upon receipt of the notice of termination, the Contractor shall act promptly to minimize the expenses resulting from such termination. The Office shall pay the Contractor the sum of:

(a) The costs actually incurred up to the effective date of such termination,

(b) The cost of settling and paying claims arising out of the termination of Work under subcontracts or orders exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by the subcontractor prior to the effective date of the Notice of Termination of Work under this Contract, which amounts shall be included in the cost on account of which payment is made under (a) above, and

(c) The rate of profit and overhead on (a) and (b) as prescribed in Division 01- General Requirements. If the Contractor would have sustained a documentable loss on the entire Contract, had it been completed, no profit shall be included or allowed under this subparagraph and an appropriate adjustment shall be made reducing the amount of the settlement to reflect the indicated rate ofloss.

15.2 In no event shall the Contractor's compensation exceed the total Contract amount.

15.3 The amount of progress payments made to the Contractor prior to the date of termination was effective shall not be conclusive evidence of costs incurred, but progress payments shall be offset against any payment which the Office makes to the Contractor as a result of such termination.

ARTICLE 16 – DISPUTES

16.1 The Contractor shall submit notice of any dispute relating to the performance of this Contract to the Director's Representative no more than fifteen (15) days after he or she knew or should have known of the facts which are the basis of the dispute. The notice shall be in writing and shall be transmitted:

i. via certified or registered United States mail, return receipt requested;

ii. by facsimile transmission;

iii. by personal delivery;

iv. by expedited delivery service; or

v. by e-mail.

16.2 The Director's Representative shall acknowledge receipt of such notice by providing written acknowledgement to the Contractor; however, failure to provide written acknowledgment shall not be a breach of contract or in any way alter the Contractor's obligation to provide timely notice. The Contractor's notice shall identify the nature of the dispute; identify the person who rendered the decision or interpretation involved, and the date of the decision or interpretation with which the Contractor disputes, attaching a copy of such decision or interpretation; contain a statement of the contractual basis for the dispute; and identify the relief sought. The Contractor shall have a continual duty to promptly provide the Director's Representative with up to date information related to the dispute.

16.3 The Contractor agrees that Article 16 does not apply to any dispute which involves delay (see Article 14), acceleration, interference or any other act or omission constituting a breach of contract; any matter relating to extensions of time, bonuses or liquidated damages; to the value of any order on contract or field order; determination of Substantial Completion, determination that Punch List items have been completed, or to any termination for cause or convenience.

16.4 The Director's Representative shall reduce his or her decision to writing and furnish a copy thereof to the Contractor. The decision of the Director's Representative shall be final and conclusive unless within twenty (20) Days from the date of receipt of the decision, the Contractor serves upon the Director a written appeal by certified mail.

16.5 Upon appeal, the decision of the Director shall be final and conclusive. In connection with any appeal proceeding held pursuant to this Article, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of his or her appeal. Pending final determination of a dispute hereunder, the Contractor shall proceed diligently with the performance of the Contract in accordance with the Director's Representative's decision. Nothing in this Contract shall be construed as making final the decision of any administrative official upon a question of law.

ARTICLE 17 – STATUTORY REQUIREMENTS FOR THE UTILIZATIONS OF MINORITY AND WOMEN OWNED BUSINESS ENTERPRISES

17.1 Pursuant to Section 313 of Article 15-A of the Executive Law of the State of New York, the Director of the Division of Minority and Women's Business Development has promulgated rules and regulations (Parts 140 through 145 of Subtitle N of Title 9 New York Code of Rules and Regulations) (the "Regulations") for the purposes of ensuring that certified Minority and Women owned Business Enterprises shall be given the opportunity for meaningful participation in the performance of State contracts and to facilitate the award of a fair share of State contracts and subcontracts to such business enterprises.

17.2 The Contractor shall make a good faith effort to solicit active participation in the Work by enterprises identified in the directory of certified businesses obtainable from the Division of Minority and Women's Business Development, New York State Department of Economic Development.

17.3 The Contractor agrees, as a material condition of this contract, to be bound by the provisions of Section 316 of Article 15-A of the Executive Law of the State of New York, which relates to the resolution of disputes, which may arise under this Article.

17.4 The Contractor agrees to include the provisions of Articles 17.2 and 17.3 of these General Conditions in every subcontract it enters into as to Work in connection with this Contract in such a manner that the provisions will be binding upon such Subcontractor. However, the provisions of this paragraph shall not be binding upon the Contractor or its subcontractors in the performance of work or the provision of services that are unrelated, separate or distinct from this Contract as expressed by its terms.

17.5 The Regulations referred to in Article 17.1 of these General Conditions require, among other things, that a bidder or proposer for a State contract submit a utilization plan which shall identify certified Minority or Women Owned Business Enterprises which the bidder/proposer intends to use in connection with the performance of the proposed State contract. Such a utilization plan shall be submitted after bids are opened but prior to contract award.

(a) Pursuant to the Regulations: (1) the Commissioner may require the submission by the Contractor of compliance reports relating to the implementation of and adherence to the utilization plan in performing the Contract; (2) the Commissioner shall allow the Contractor to apply for a partial or total waiver of the Minority and Women Owned Business participation requirements; (3) the Contractor may file a complaint with the Executive Director of the Division of Minority and Women's Business Development regarding a denial of a request for waiver of Minority and Women Owned Business participation requirements; (4) the Commissioner may file a complaint with the Executive Director of the Division of Minority and Women's Business Development in the event the Contractor fails to comply with the Minority and Women Owned Business participation requirements set forth in this Contract; and (5) the Commissioner may disqualify the Contractor's bid or proposal as being non-responsive for failure to remedy notified deficiencies contained in the Contractor's utilization plan for an administrative hearing on the record, reviewing all grounds for the disqualification state by the Commissioner and taking into consideration all of the criteria set forth in § 313 of the Executive Law.

(b) The Contractor is referred to the entirety of the provisions of Section 316 of Article 15-A of the Executive Law of the State of New York and of the Regulations for the Contractor's full familiarization with their applicable provisions as terms of this Contract.

ARTICLE 18 – SUBCONTRACTS

18.1 Before any part of the Contract shall be sublet, the Contractor shall submit to the Director's Representative in writing the name of each proposed Subcontractor and supplier and obtain the Director's Representative's written consent to such Subcontractor and supplier. The names shall be submitted in ample time to permit acceptance or rejection of each proposed Subcontractor by the Director's Representative without causing delay in the work of the Project.

18.2 If the value of the Subcontract is $10,000 or more, the Contractor shall promptly furnish a "NEW YORK STATE VENDOR RESPONSIBILITY QUESTIONNAIRE FOR PROFIT CONSTRUCTION (CCA-2)" for each Subcontractor and receive approval of the same prior to delivery of materials or performance of work from this Subcontractor.

18.3 The Contractor's use of subcontractors shall not diminish the Contractor's obligations to complete the work in accordance with the Contract. Each Contractor shall control and coordinate the work of his or her Subcontractors.

18.4 The Contractor shall be responsible for informing the Subcontractors of all the terms, conditions and requirements of the Contract Documents including, but not limited to the General Conditions and the Detailed Specifications.

ARTICLE 19 - COORDINATION OF SEPARATE CONTRACTS (WICKS PROJECTS)

19.1 The Office may award other contracts related to the Work. In that event, the Contractor shall coordinate his or her work with the Work of other contractors in such manner as the Office may direct. All contractors shall exchange working drawings, examine them and report any interferences or objections to the Director's Representative, in order to avoid delays. Each contractor shall control and coordinate the work of his or her Subcontractors, if any. The Office shall approve or require the modification of the work schedules of all contractors to the end that the Project may be progressed as expeditiously as the case permits.

19.2 If any part of the Work depends for proper execution or results upon the work of any other contractor, the Contractor shall inspect and promptly report in writing to the Director's Representative any defects in such work. The failure to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of the Contractor's Work.

19.3 The Director's Representative shall issue appropriate directions and take such other measure to coordinate and progress the Work as may be reserved to the Office in the Contract, and which an ordinarily reasonable project owner in similar circumstances would be expected to take. However, the Office shall not be liable for mere errors in judgment as

to the best course of action to adopt among the alternatives available in any given instance.

19.4 The award of more than one contract for the Project requires sequential or otherwise interrelated contractor operations and will involve inherent coordination in the progress of any individual contractor's work. Accordingly, the Office cannot guarantee the unimpeded operations of any contractor. The Contractor acknowledges these conditions and understands that he or she shall bear the risk of all ordinary delays caused by the presence or operations of other contractors engaged upon the project, and ordinary delays attendant upon any Office approved construction schedule. Should a contractor sustain damage through any act or omission of any other contractor, the contractor shall have no claim against the Office.

19.5 The Office shall not be liable for ordinary delays in any case nor for extraordinary delays that occur due to any contractor's failure to comply with directions of the Office or because of the neglect, failure or inability of any contractor to perform his or her work efficiently.

19.6 Any claim for extraordinary delay caused by an allegedly unreasonable or arbitrary act, or failure to act, by the Director's Representative in the exercise of his or her responsibility for supervision and coordination of the Work, shall be waived, released and discharged unless the Contractor whose work is impeded or delayed thereby, shall give notice in writing to the Director's Representative as promptly as possible and in sufficient time to permit the Director's Representative to investigate appropriate instructions.

19.7 The neglect or refusal of a Contractor to comply with supervisory directions issued by the Director's Representative pursuant to his or her responsibility for supervision of the Work shall constitute a failure to progress the work diligently in accordance with the Contract requirements and shall justify withholding payments otherwise due, or termination of the Contract as detailed in Article 15.

19.8 The Contractor shall indemnify the Office for damages recovered against the Office by another contractor to the extent that any such claim or judgment is the proximate cause of the Contractor's failure to progress the work in accordance with Contract requirements.

ARTICLE 20 – RESPONSIBILITY FOR DAMAGE AND INDEMNIFICATION

20.1 The Contractor shall faithfully perform and complete all of the work required by the Contract, and has full responsibility for the following risks:

(a) Loss or damage, direct or indirect; to the Work including the building or structure in which the Work is being performed, or any other construction in progress, whether being performed by any other contractor or by the Office, or to any plant, equipment, tools, materials or property furnished, used, installed, or received by the Director's Representative under this Contract or any other contract. The Contractor shall bear all such risk of loss or damage, until all of the Work covered by the Contract has been finally accepted. In the event of such loss or damage, the

Contractor shall forthwith repair, replace, and make good any such loss or damage without additional costs.

(b) Injury to persons (including death resulting therefrom), or damage to property caused by an occurrence arising out of the performance of this Contract for which the Contractor may be liable under any theory of law.

20.2 Contractor assumes all risks in the performance of all activities authorized by this Contract and agrees to defend, indemnify and hold harmless the People of the State of New York, the Office, their officers, employees, agents and assigns (hereinafter, collectively the "Indemnitees") from and against any and all claims, suits, losses, damage or injury to persons or property of whatsoever kind and nature, whether direct or indirect, caused or contributed to by Contractor and Contractor's sub-contractors, vendors, material suppliers, employees, agents, invitees and guests, and/or arising out of Contractor's conduct and/or Contractor's performance pursuant to this Contract, provided however that Contractor's indemnity shall not extend to any claims, liabilities, losses, damages, expenses, accidents or occurrences arising out of, relating to, or in connection with: (i) the negligence of any Indemnitee; or (ii) the Indemnitees' ordinary upkeep and maintenance of the Park and its grounds and facilities outside of the Premises. Contractor shall defend at its sole cost and expense any action commenced for the purpose of asserting any claim of whatsoever character arising out of this Contract. Contractor's responsibility under this section shall not be limited to the required or available insurance coverage.

20.3 For all purposes hereunder, the Office shall not be liable for any injury, loss or damage to Contractor, its agents, servants, sub-contractors, vendors, invitees and guests, or to any person happening on, in or about the Premises or its appurtenances, nor for any injury or damage to the Premises or to any property belonging to Contractor or to any other person, that may be caused by fire, theft, breakage, vandalism or any other use or misuse or abuse of any portion of the Premises, including but not limited to any common areas, sidewalks, roads, or water in or adjacent to the Premises, or that may arise from any other cause whatsoever, unless, and only to the extent of the proportion of which any such injury, loss or damage is determined to be caused by the negligence of the Office.

20.4 The Office shall not be liable to Contractor, its agents, contractors, vendors, invitees and guests, or any other person, for any failure of water supply, gas supply or electric current, nor for any injury or damage to any property of Contractor or any other person or to the Premises, caused by or resulting from spill or release of gasoline, oil, steam, gas, or electricity, or caused by leakage of any substance from pipes, appliances, sewers or plumbing works, or caused by hurricane, flood, tornado, wind or similar storm or disturbance, or caused by water, rain or snow that may leak or flow from the street, sewers or subsurface areas, or from any part of the Premises or any body of water within or adjacent to the Premises, or caused by any public or quasi-public work, unless, and only to the extent of the proportion by which any such injury, loss or damage is determined to be caused by the negligence of the Office.

20.5 The Office may retain such monies from the amount due the Contractor as may be

necessary to satisfy any claim for damages recovered against the State. The Contractor's obligations under this paragraph shall not be deemed waived by the failure of the Office to retain the whole or any part of such monies due the Contractor, nor shall such obligation be deemed limited or discharged by the enumeration or procurement of any insurance for liability for damages imposed by law upon the Contractor, Subcontractor or the State.

20.6 The Contractor agrees to make no claim for damages in the performance of the Contract occasioned by any act or omission to act of the Office or its representatives and agrees that any such claim shall be fully compensated for by an extension of time to complete performance of the Work as provided herein.

20.7 The Contractor shall not create or cause to be created any lien, encumbrance or charge upon the Premises, the Office or any part thereof. If any mechanics, laborers or similar statutory or common law lien (including tax liens, provided that the underlying tax is an obligation of Contractor by law or by a provision of this Contract) caused or created by Contractor is filed against the Premises, or if any public improvement lien created or caused to be created by Contractor is filed against any assets of, or funds appropriated by the Office, then Contractor shall, within forty-five (45) days after receipt of notice of the lien, cause it to be vacated or discharged of record by payment, deposit, bond, court order, or otherwise. However, Contractor shall not be required to discharge any such lien if Contractor shall have: (i) furnished the Office with, at Contractor's option, a cash deposit, bond, letter of credit (from an institutional lender in a form satisfactory to the Office), or other security reasonably satisfactory to the Office in an amount sufficient to discharge the lien and all applicable interest, penalties and/or costs; and (ii) brought an appropriate legal proceeding to discharge the lien and is prosecuting such proceeding with diligence and continuity; except that if despite Contractor's efforts to discharge the lien the Office reasonably believes the lien is about to be foreclosed and so notifies Contractor, Contractor shall immediately cause such lien to be discharged of record or the Office may use the security furnished by Contractor in order to discharge the lien.

ARTICLE 21 - INSURANCE

21.1 General Requirements. During the term of the Contract, and any renewal or extensions thereof, the Contractor shall maintain in force, at its sole cost and expense, policies of insurance as required in this Article ("Insurance"). All Insurance shall be written by companies that have an A.M. Best Company rating of "A-" Class "VII" or better. In addition, companies writing the Insurance should be licensed or authorized by the New York State Department of Financial Services to issue the Insurance in the State of New York. OPRHP may, at its sole discretion, accept Insurance written by a non-authorized company or companies when certificates and/or other policy documentation are accompanied by a completed Excess Lines Association of New York (ELANY) Affidavit or other documents demonstrating the company's strong financial rating (such companies identified in the preceding sentences, whether authorized or non-authorized, referred to hereafter as "Insurer"). If during the term of a policy, the company's A.M. Best rating falls below "A-," Class "VII," the Insurance must be replaced, on or before the renewal date of the policy with Insurance that meets the requirements above.

(a) The Contractor shall deliver to OPRHP evidence of the Insurance in a form acceptable to OPRHP. Policies must be written in accordance with the requirements

of this Article, as applicable. Acceptance and/or approval by OPRHP does not, and shall not be construed to, relieve the Contractor of any obligations, responsibilities, or liabilities under the Contract.

(b) The Contractor shall not take any action or omit to take any action that would suspend or invalidate any of the required coverages during the term of the Contract, and any extension or holdover thereof.

21.2 Conditions of Coverage. All Insurance must comply with the following conditions:

(a) Coverage Types and Policy Limits. The types of coverage and policy limits required from the Contractor are specified below in Section 21.3, Specific Coverages and Limits.

(b) Policy Forms. Except as otherwise specifically provided herein, or agreed to in writing by OPRHP, all Insurance shall be written on an occurrence basis. Under certain circumstances, OPRHP may elect to accept policies written on a claims-made basis provided that, at a minimum, the policy remains in force throughout the performance of the services and for three (3) years after completion of the Contract. If the policy is cancelled or not renewed during that time, the Contractor must purchase, at its sole expense, tail coverage sufficient to cover the 3-year period after completion of the Contract. Written proof of this extended reporting period must be provided to OPRHP prior to the policy's expiration or cancellation.

(c) Certificates of Insurance/Notices. The Contractor shall provide a Certificate or Certificates of Insurance, in a form satisfactory to OPRHP (i.e., an ACORD Certificate), before commencing any Work under the Contract, and thereafter, pursuant to the timelines set forth in Section 21.2(p) below. Certificates shall reference the Contract number and shall name OPRHP as the Certificate holder. Certificates shall be mailed to the:

ATTN: Capital Bureau
New York State Office of Parks, Recreation and Historic Preservation
625 Broadway
Albany, NY 12238

(d) Certificates of Insurance shall:

i. Be in a form acceptable to OPRHP an in accordance with the New York State Insurance Law (i.e., an ACORD certificate);

ii. Be filled out completely, and include without limitation, the date of issuance, names of the insured, insurer, insurer's National Association of Insurance Commissioner's (NAIC) number, policy numbers, coverage period, any deductible or self-insured retention amounts, each occurrence and aggregate limits, and exclusions or additional coverages, or additional insured endorsements to the policy;

iii. Disclose any deductible, self-insured retention, aggregate limit or any exclusion to the policy that materially changes the coverage required by the Contract;

iv. Refer to the Contract by number (i.e. D00XXXX);

v. Be signed by an authorized representative of the Insurer; and

vi. Include the following provision:

"Consistent with the requirements of Contract D00XXXX, The People of the State of New York and The New York State Office of Parks, Recreation and Historic Preservation, and their officers, agents, and employees are endorsed to all policies of liability insurance as Additional Insured."

Simply designating OPRHP as a certificate holder shall not constitute compliance with this Article.

(e) Only original documents (Certificate(s) and any endorsements or other attachments) or electronic versions of the same that can be directly traced back to the Insurer, Agent or Broker via e-mail distribution or similar means will be accepted.

(f) OPRHP has not requested that the Contractor submit copies of its entire Insurance policies. Generally, OPRHP only requests specific documentation regarding proof of coverage, such as Certificates and endorsements. The Contractor is asked to refrain from submitting entire Insurance policies, unless specifically requested by OPRHP. If an entire Insurance policy is submitted but not requested, OPRHP shall not be obligated to review and shall not be chargeable with knowledge of its contents. In addition, submission of an entire Insurance policy not requested by OPRHP does not constitute proof of compliance with the Insurance requirements and does not discharge the Contractor from submitting the documentation required by this Article.

(g) Primary Coverage. All liability Insurance policies shall provide that the required coverage shall be primary and non-contributory to other insurance available to OPRHP. Any other insurance maintained by OPRHP shall be excess of and shall not contribute with the Contractor's Insurance. For purposes of clarity, no insurance policies maintained by any Additional Insured, whether primary or excess, and which also apply to a loss covered hereunder, shall be called up on to contribute to a loss until Contractor's primary and excess liability policies are exhausted.

(h) Claims Made Policies. If any of the required policies provide coverage on a claims-made basis, then:

i. The retroactive date must be shown and must be before the date the Work under the Contract is to commence.

ii. Insurance must be maintained, and evidence of insurance provided, for at least three (3) years after completion of the Work under the Contract.

iii. If coverage is canceled or non-renewed and not replaced with another claims-made policy form with a retroactive date prior to the date the work under the Contract commenced, the Contractor must purchase extended reporting coverage for a minimum of three (3) years after completion of the Work.

(i) Breach for Lack of Proof of Coverage. The term of the Contract shall not commence if the coverage provisions and limits of the Insurance provided by the Contractor do not meet the provisions and requirements of this Article or proof of compliance is not provided to OPRHP. In addition, the failure to comply with the requirements of this Article at any time during the term of the Contract, and any

extension or holdover thereof, shall be considered a breach of Contract and shall allow OPRHP to avail itself of all remedies available under the Contract, at law or in equity.

(j) Self-Insured Retention/Deductibles. Certificates of Insurance must indicate the applicable deductibles or self-insured retentions for each listed policy. deductibles or self-insured retentions above $100,000.00 are subject to approval from OPRHP. Such approval shall not be unreasonably withheld, conditioned, or delayed. The Contractor shall be solely responsible for all claim expenses and loss payments within the deductible or self-insured retentions. If the Contractor is providing the required insurance through self-insurance, evidence of the financial capacity to support the self-insurance program along with a description of that program, including, but not limited to, information regarding the use of a third-party administrator shall be provided upon request.

(k) Subcontractors. Prior to the commencement of any work by a subcontractor, the Contractor shall require such subcontractor to procure Insurance that comply with the requirements of this Article and maintain the same in force during the term of any work performed by that subcontractor. An Additional Insured Endorsement CG 20 38 12 19 (or the equivalent) evidencing such coverage shall be provided to the Contractor prior to the commencement of any work by a subcontractor, pursuant to the timelines set forth in Section 21.2(p) below, as applicable, and to OPRHP upon request. For subcontractors that are self-insured, the subcontractor shall be obligated to defend and indemnify the above-named Additional Insureds with respect to required liability insurance policies, in the same manner that the subcontractor would have been required to pursuant to this section had the subcontractor obtained such insurance policies

(l) Additional Insured. The Contractor shall cause to be included in each of the liability policies required below, ISO form CG 20 10 11 85 (or a form or forms that provide equivalent coverage, such as the combination of the CG 20 10 12 19 and CG 20 37 12 19) and form CA 20 48 10 13 (or a form or forms that provide equivalent coverage), naming as Additional Insureds: The People of the State of New York, The New York State Office of Parks, Recreation and Historic Preservation, and their officers, agents, and employees. An Additional Insured Endorsement evidencing such coverage shall be provided to OPRHP prior to the commencement of the Contractor and pursuant to the timelines set forth in Section A.14. below. A blanket Additional Insured Endorsement CG 20 38 12 19 (or the equivalent) evidencing such coverage for Commercial General Liability Insurance is also acceptable. If the Contractor is self-insured, the Contractor shall be obligated to defend and indemnify the above-named Additional Insureds with respect to required liability insurance policies, in the same manner that the Contractor would have been required to pursuant to this Article had the Contractor obtained such policies.

(m) Excess/Umbrella Liability Policies. Required liability insurance coverage limits may be provided through a combination of primary and excess liability and umbrella liability policies. If coverage limits are provided through excess liability and umbrella liability policies, then a “Schedule of Underlying Insurance,” or other such schedule, listing policy information for all underlying insurance policies

(Insurer, policy number, policy term, coverage, and limits of insurance), including proof that the excess liability and umbrella liability insurance follows form, must be provided upon request.

(n) Notice of Cancellation or Non-Renewal. Policies shall be written to include the requirements for notice of cancellation or non-renewal in accordance with the New York State Insurance Law. Within five (5) business days of receipt of any notice of cancellation or non-renewal of Insurance, the Contractor shall provide OPRHP with a copy of any such notice received from an Insurer together with proof of replacement coverage that complies with the requirements of this section.

(o) Policy Renewal/Expiration. Upon policy renewal/expiration, evidence of renewal or replacement of coverage that complies with the requirements of this section shall be delivered to OPRHP. If, at any time during the term of the Contract, and any extension or holdover thereof, the coverage provisions and limits of the policies required herein do not meet the provisions and limits set forth in this Article, or proof thereof is not provided to OPRHP, OPRHP shall have the right to avail itself of all remedies available under the Contract, at law or in equity.

(p) Deadlines for Providing Insurance Documents after Renewal or Upon Request. As set forth herein, certain documents must be provided to OPRHP after renewal or upon request. This requirement means that the Contractor shall provide the applicable document to OPRHP as soon as practicable, but in no event later than the following time periods:

i. For Certificates of Insurance: five (5) business days from the request or renewal, whichever is later;

ii. For information on self-insurance of self-insurance retention programs: fifteen (15) calendar days from request or renewal, whichever is later;

iii. For other requested documentation evidencing coverage: fifteen (15) calendar days from request or renewal, whichever is later.

iv. For Additional Insured and waiver of subrogation endorsements: thirty (30) calendar days from request or renewal, whichever is later.

Notwithstanding the foregoing, if the Contractor shall have promptly requested the Insurance documents from its broker or insurer and shall have thereafter diligently taken all steps necessary to obtain such documents from its insurer and submit them to OPRHP, OPRHP shall extend the time periods set forth above for a reasonable period, that shall in no event exceed thirty (30) calendar days from request or renewal, whichever is later.

21.3 Specific Coverages and Limits. Prior to performing any Work under this Contract, the Contractor shall obtain, at its sole cost and expense, all insurance required in Appendix C – Specific Insurance Coverages and Limits

ARTICLE 22 - COMPLETION AND ACCEPTANCE

22.1 The Office shall have the right to take possession of or use any completed or partially

completed portion of the Work. Written notice of such possession shall be given to the Contractor by the Director's Representative. The notice shall identify the date when such possession shall commence and the area, equipment or system involved. Written notice shall also be given to the Contractor for any cessation of such possession by the State. Such possession or use shall not be deemed an acceptance of any Work. While the State is in such possession, the Contractor, notwithstanding the provisions of Article 20 of the Contract, shall be relieved of the responsibility for the risk of loss or damage to the Work except for that resulting from the Contractor's fault or negligence. If such possession or use by the State delays the progress of the Work or causes additional expense to the Contractor, an adjustment in the Contract price and/or the time of completion shall be made and the Contract modified in writing accordingly. The provisions relating to an adjustment in the Contract price or the time of completion contained in this paragraph shall not apply to occupancy or possession after Substantial Completion.

22.2 Contractor will notify the Director's Representative in writing when Contractor believes that the Work is Substantially Complete and request that the Director's Representative issue a Certificate of Substantial Completion. Contractor shall prepare and submit at the same time as the notice required in this Article 22.2, an initial list of items to be completed or corrected before final payment.

22.3 Upon receipt of the Contractor's list, the Director's Representative or their designee will inspect the Work to determine whether the Work is Substantially Complete in their sole discretion. Such determination shall not be subject to any dispute provisions available under this Contract.

(a) If Director's Representative or their designee determines that the Work is not Substantially Complete, the Director's Representative will notify the Contractor in writing of the Work that must be sufficiently complete to deem the Work Substantially Complete. Contractor will promptly complete all Work contained within that notice and follow the same process set forth in this Article for notifying Director's Representative upon such completion.

(b) If the Director's Representative or their designee determines that the Work is Substantially Complete, the Director's Representative will deliver to the Contractor a Certificate of Substantial Completion setting forth the date of Substantial Completion and Punch List. The Punch List may include Work additional to or removed from the Contractor's initial list provided under Article 22.2.

(c) Upon issuance of the Certificate of Substantial Completion, Contractor shall submit a payment application for Substantial Completion under Article 23.6.

22.4 The Director's Representative will update the Punch List as the remaining items of Work are satisfactorily completed or corrected.

22.5 Contractor will notify the Director's Representative in writing when the Contractor believes that all items on the Punch List have been completed or corrected.

22.6 Upon receipt of the Contractor's notification that the Punch List has been completed, the Director's Representative or their designee will inspect the Punch List items to determine whether the Punch List has been completed. Such determination shall not be subject to any dispute provisions available under this Contract.

(a) If Director's Representative or their designee determines that the Punch List is not completed, the Director's Representative will notify the Contractor in writing of the Punch List items that must be completed or corrected to deem the Punch List completed. Contractor will promptly complete all items contained within that notice and follow the same process set forth in this Article for notifying Director's Representative upon such completion.

(b) If the Director's Representative or their designee determines that the Punch List is completed, the Director's Representative will deliver to the Contractor a Certificate of Acceptance setting forth the Physical Completion Date.

(c) Upon issuance of the Certificate of Acceptance, Contractor shall submit a payment application for final payment under Article 23.7.

ARTICLE 23 – PAYMENT

23.1 The Contractor may submit monthly payment applications, or more frequently if permitted by making a request in writing to the Director's Representative, a requisition for a progress payment for Work performed and materials furnished to the date of the requisition, less any amount previously paid to the Contractor. Except as otherwise provided by this Contract, the Director's Representative shall approve and pay the requisition for the progress payment less an amount necessary to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged and less any amount authorized by law or Contract to be retained. The requisition shall be in such form and supported by such evidence as the Director's Representative may reasonably require.

23.2 The Contractor agrees that, if the Contract Documents for this Contract includes Performance and Payment Bonds, the State shall retain five percent of the amount of each progress payment in accordance with Section 139-f of the State Finance Law. The Contractor further agrees that, it the Contract Document for this Contract do not include Performance and Payment Bonds, the State shall retain ten percent of the amount of each progress payment in accordance with Section 139-f of the State Finance Law.

23.3 All requisitions for payments shall be submitted to the designated payment office. The designated payment office shall notify the Contractor of any defect in any requisition within twenty (20) days of the receipt of such requisition and shall complete the review and audit of each complete requisition within forty-five (45) days of receipt thereof.

23.4 The Director's Representative may refuse to approve the requisition or a portion thereof if in the Director's Representative's judgment the Contractor is failing or refusing to prosecute the Work in accordance with the Contract.

23.5 Payment may be made for approved materials not yet incorporated in the Work in accordance with the Schedule of Values and Section 139(f) of the State Finance Law. Requisitions, which require payment for materials, shall be accompanied by a notarized statement certifying that the materials for which payment is requisitioned are the Contractor's property and have been suitably stored and insured. The Contractor shall provide such evidence of the value of the material stored as the Director's Representative may reasonably require. The Contractor shall have full

continuing responsibility to insure and protect such materials and maintain them in proper condition to fulfill Contract requirements when installed.

23.6 When the Work is Substantially Completed, the Contractor shall submit to the Director's Representative a requisition for payment of the remaining amount of the Contract balance. The Contractor shall attach a copy of the Certificate of Substantial Payment to such requisition. Upon receipt of such requisition the Director's Representative shall, except as otherwise provided by this Contract, approve and pay the remaining amount of the Contract balance less two times the value of any remaining items identified on the Punch List, and an amount necessary to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged. As the remaining items of Work are satisfactorily completed or corrected, the Director's Representative shall approve, upon receipt of a requisition, for these remaining items less an amount necessary to satisfy any claims, liens or judgments against the Contractor, which have not been suitably discharged.

23.7 When the Punch List is completed, the Contractor shall submit to the Director's Representative a requisition for final payment. The Contractor shall attach a copy of the Certificate of Acceptance to such requisition. The final payment will not be issued until all the labor and material required by the Contract has been furnished and completed, all disputes relating to the performance of the Contract considered and disposed of and all accounts for extra work and materials and allowances for omissions have been rendered and considered.

23.8 The final payment will constitute the acceptance of the Work by the Office except as to Work thereafter found to be defective. The date of the Certificate of Acceptance shall be regarded as the date of acceptance of the Work.

23.9 No payment will be made to a foreign Contractor until the Contractor furnishes satisfactory proof that he or she has paid all taxes required of foreign Contractors under the provisions of the Tax Law. A foreign Contractor as used in this paragraph shall mean a Contractor denominated "foreign" by the Tax Law.

23.10 Acceptance by the Contractor, or by anyone claiming by or through him or her, of the final payment shall constitute and operate as a release to the State from any and all claims of any liability to the Contractor for anything theretofore done or furnished for or relating to or arising out of the work done thereunder, and for any prior act, neglect, or default on the part of the State or any of its officers, agents, or employees unless the Contractor serves a detailed and verified statement of claim upon the Office not later than 40 days after the mailing of such final payment. Such statement shall specify the items and details upon which the claim will be based and any such claim shall be limited to such items. Should the Contractor refuse to accept the final payment as tendered by the Comptroller, it shall constitute a waiver of any right to interest thereon.

23.11 The Contractor is advised that consistent with Subdivision 3-a, of Section 220 of the Labor Law, the filing of certified payroll records is a condition precedent to payment of any sums due and owing to any person performing work on this project. The failure to file pursuant to this section will result in a payment delay until the filing occurs.

23.12 The Contractor acknowledges that it shall not receive payment on any requests for payment unless the Contractor complies with the Comptroller's electronic payment deposit procedures. Payments requested by the Contractor shall only be facilitated via electronic deposit, except where the Commissioner has expressly authorized payment by paper check.

ARTICLE 24 – AUDITS AND RECORDS

24.1 The Contractor shall maintain on the Site the original certified payrolls or certified transcripts thereof, subscribed and affirmed by the Contractor and all Subcontractors as true under the penalties of perjury, showing the hours and days worked by each worker, laborer or mechanic, the occupation at which he or she worked, the hourly wage rate paid and the supplements paid or provided. The Contractor shall maintain with the payrolls or transcripts thereof, the statements signed by each worker pursuant to Article 25 of the General Conditions.

24.2 The Director's Representative, the Comptroller and their representatives who are employees of the State shall have the right to examine all books, records, documents, and other data of the Contractor, any Subcontractor, materialmen or suppliers relating to the bidding, pricing or performance of this Contract or any change or modification thereto for the purpose of evaluating the accuracy, completeness, and currency of the cost or pricing data submitted. This right of examination shall extend to all documents necessary to permit adequate evaluation of the cost or pricing data submitted along with the computations and projections used therein.

24.3 The above materials shall be made available at the office of the Contractor, Subcontractors, materialmen or suppliers at all reasonable times for inspection, audit or reproduction until the expiration of six (6) years from the date of the final certificate for the Contract.

24.4 If this Contract is completely or partially terminated, the records relating to the Work terminated shall be made available for a period of six (6) years from the date of any resulting final settlement.

24.5 Records that relate to the Disputes Clause of this Contract or litigation or the settlement of claims arising out of the performance of this Contract shall be made available until the disposal of such appeals, litigation or claims.

24.6 The Contractor shall insert a clause containing all of the provisions of Article 24 in all subcontracts or purchase orders issued hereunder.

24.7 The Contractor shall make available to the Director, upon written request, all records required to be kept by Article 3-A of the Lien Law. The failure to provide said records upon the receipt of the written request shall bar any recovery for claimed extra or additional costs under this Contract.

ARTICLE 25 – LABOR LAW AND PREVAILING WAGES NOTIFICATIONS PROVISIONS

25.1 In addition to any other provisions of this Contract in relation to prevailing wage rates, the Contractor shall be responsible for the certain notifications.

25.2 The Contractor shall post, in a location designated by the Office, a copy of the New York State Department of Labor schedules of prevailing wages and supplements for this Project, a copy of all re-determinations of such schedules for the Project, all other notices required by law to be posted at the Site, the Department of Labor notice that this Project is a public work project on which each worker is entitled to receive the prevailing wages and supplements for the occupation at which he or she is working, and all other notices which the Office directs the Contractor to post. The Contractor shall provide a surface for such notices, which is satisfactory to the Office. The Contractor shall maintain such notices in a legible manner and shall replace any notice or schedule that is damaged, defaced, illegible or removed for any reason. The Contractor shall post such notices before commencing any Work on the Site and shall maintain such notices until all Work on the Site is complete.

25.3 The Contractor shall distribute to each worker for this Contract a notice, in a form provided by the State, that this project is a public work project on which each worker is entitled to receive the prevailing wage and supplements for the occupation at which he or she is working. Worker includes employees of Contractor and all Subcontractors and all employees of suppliers entering the Site. Such notice shall be distributed to each worker in accordance with Labor Law 220 3-a.

25.4 In addition to the requirements of Appendix A, paragraph 6 entitled "Wage and Hours Provisions", the Contractor is responsible for any additional costs related to new determinations of the wage rates. The annual determination of the prevailing rates of wages and supplements are usually published on May 31st of each year and are in effect July 1st through June 30th. New determinations shall supersede the original schedule or any prior issued annual determination. Any rate change from a previously issued determination becomes effective July 1st, regardless of whether the new determination has been received by the Contractor.

ARTICLE 26 - STATUTORY REQUIREMENTS FOR RESTRICTIONS ON CONTACTS DURING THE PROCUREMENT PROCESS AND DISCLOSURE OF CONTACTS AND RESPONSIBILITY OF OFFERERS MISCELLANEOUS PROVISIONS

26.1 New York State Finance Law §139-k requires that every procurement contract award subject to the provisions of State Finance Law §139-k or §139-j shall contain a certification by the Offerer that all information provided to the procuring governmental agency with respect to State Finance Law §139-k is complete, true and accurate. The Contractor shall provide that certification in his or her contract or agreement.

26.2 New York State Finance Law

(a) New York State Finance Law § 139-k(2) requires the Office to obtain specific information regarding prior non-responsibility determinations. This information must be collected in addition to the information that is separately obtained pursuant

to State Finance Law § 163 (9). In accordance with State Finance Law § 139-k, an Offerer must be asked to disclose whether there has been a finding of non-responsibility made within the previous four (4) years by any Governmental Entity due to: (a) a violation of State Finance Law § 139-j or (b) the intentional provision of false or incomplete information to a Governmental Entity.

(b) As part of its responsibility determination, State Finance Law § 139-k(3) mandates consideration of whether an Offerer fails to timely disclose or complete information regarding the above non-responsibility determination. In accordance with law, no procurement contract shall be awarded to any Offerer that fails to timely disclose accurate or complete information under this section, unless a finding is made that the award of a procurement contract to the Offerer is necessary to protect public property or public health safety, and that the Offerer is the only source capable of performing the required Work within the necessary timeframe. The required forms to be completed by the Offerer must be submitted to the Office.

ARTICLE 27 – EMBODIED CARBON DISCLOSURE & CLEAN CONCRETE COMPLIANCE

27.1 Executive Order 22: Leading by Example: Directing State Agencies to Adopt a Sustainability and Decarbonization Program (EO 22) requires the disclosure of embodied carbon that will result from all OPRHP construction projects costing over $1 million that use certain minimum quantities of concrete mixes, asphalt mixes, steel, and glass ("Covered Construction Materials") as those quantities are set forth in the GreenNY Council Embodied Carbon Guidance. The GreenNY Council Embodied Carbon Guidance is available here: https://ogs.ny.gov/executive-order-22-embodied-carbon-guidance. Contractor warrants that Contractor has reviewed and is familiar with all GreenNY Council Embodied Carbon guidance and/or guidelines.

27.2 Contractor shall be required to submit EPDs for all Covered Construction Materials, if available, used in the Project. EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 Environmental labels and declarations, ISO 14044 Environmental management-life cycle assessment, and ISO 21930 Core rules for environmental product declarations of construction products and services. Digitized EPDs can be found on EPD databases and sent as a link to the Director's Representative as part of the submittals process and in relation to the disclosure required in this Article 27.2.

27.3 For Covered Construction Materials, Contractors shall disclose with each payment application, the exact Covered Construction Materials and estimated quantities used in the Project whether or not an EPD exists for that particular material/product.

27.4 Section 136-d ("SFL § 136-d") of the State Finance Law requires the Office of General Services ("OGS") to establish guidelines requiring the procurement of low embodied carbon concrete on projects deemed appropriate by OGS. The NYS Buy Clean Concrete Guidelines established by OGS require that building construction projects costing over $1 million that use 50 or more cubic yards of concrete procure low embodied carbon concrete that has a Global Warming Potential ("GWP") value below the maximum GWP limits set forth in the Guidelines. Contractor warrants that Contractor has reviewed and is familiar with the NYS Buy Clean Concrete Guidelines available here: https://ogs.ny.gov/nys-buy-clean-concrete-

guidelines-0.

27.5 Contractor shall be required to certify, with the product submittal, that all procured concrete utilized on the project meet the minimum standards set forth in the NYS Buy Clean Concrete Guidelines, which include submission of an acceptable EPD with a GWP lower than the maximum limit. If Contractor is unable to meet the minimum standards for a concrete mix, Contractor must obtain an exemption from OPRHP to be provided in accordance with Division 01- General Requirements specific to Environmental Product Declarations and Clean Concrete Requirements.

ARTICLE 28 – MISCELLANEOUS PROVISIONS

28.1 Commencement of Actions: The time, as prescribed by law, within which an action on the contract against the Contractor must be commenced shall be computed from the date of completion of physical work. The Contractor shall notify the Office in writing that the physical work of the contract has been completed by specifying a completion date, which date shall be no more than thirty days prior to the date of such notice. The completion date set forth in such notice shall be deemed the date of completion of the physical work unless the Office, within thirty days of receipt of such notice, notifies the Contractor of a dispute in writing. Any notice pursuant to this paragraph shall be sent by the Contractor by Certified Mail and sent to the parties set forth in the Notice provision of this Article.

(a) In the event that the Contractor fails to provide notice as set forth herein or the Office disputes the completion date in the manner provided for herein, the date of completion of the physical work shall be determined in any other manner provided by law.

(b) Choice of Law/Damages: This Contract shall be governed and interpreted in accordance with the laws of the State of New York. Any and all claims against the State, the Office, its Commissioner, employees, officers or agents arising out of this Contract shall be limited to money damages and commenced exclusively in, and subject to the jurisdiction of the New York State Court of Claims or any other court of competent jurisdiction located in Albany County, New York. Any such claim shall not be removed to federal court.

28.2 Notice

(a) Unless otherwise indicated in these General Conditions, all notices permitted or required hereunder shall be in writing and shall be transmitted either:

i. via certified or registered United States mail, return receipt requested;

ii. by facsimile transmission;

iii. by personal delivery;

iv. by expedited delivery service; or

v. by e-mail.

Such notices shall be addressed as follows or to such different addresses as the parties may from time-to-time designate:

If to the Office:

Capital Unit
New York State Office of Parks, Recreation and Historic Preservation
Albany, NY 12238
Phone (518) 473-7435
Fax: (518) 486-2372
E-Mail Address: capital@parks.ny.gov

and

General Counsel
New York State Office of Parks, Recreation and Historic Preservation
Albany, NY 12238
Phone (518) 486-2921
Fax: (518) 474-5106
E-Mail Address: counsel@parks.ny.gov

(b) Any such notice shall be deemed to have been given either at the time of personal delivery or, in the case of expedited delivery service or certified or registered United States mail, as of the date of first attempted delivery at the address and in the manner provided herein, or in the case of facsimile transmission or email, upon receipt.

(c) The parties may, from time to time, specify any new or different address in the United States as their address for purpose of receiving notice under this Contract by giving fifteen (15) days written notice to the other party sent in accordance herewith. The parties agree to mutually designate individuals as their respective representatives for the purposes of receiving notices under this Contract.. Additional individuals may be designated in writing by the parties for purposes of implementation and administration/billing, resolving issues and problems and/or for dispute resolution.

28.3 Severability: If any provision, term or condition of this contract is held to be invalid, illegal, or unenforceable, such determination shall not affect the validity, legality or enforceability of any other part of this Contract and the remaining parts of this Contract shall be enforced as if the invalid, illegal or unenforceable provisions, terms or conditions are not contained herein.

28.4 Integration Clause: This Contract shall not be materially amended, changed or otherwise modified except in writing signed by both parties and approved by the Attorney General and Office of the State Comptroller. Except to the extent that documents are incorporated herein by reference, this Contract constitutes the entire agreement between the parties concerning the subject matter hereof and supersedes all prior agreements and

understandings of the parties in connection therewith. No covenant, representation or condition not expressed herein shall be effective to interpret, change or restrict the express provisions of this Contract.

APPENDICES

29.1 The following appendices are attached hereto and hereby made a part of this agreement as if set forth fully herein.

(a) Appendix A -Standard Clauses for All New York State Contracts;

(b) Appendix B;

(c) Appendix C - Specific Insurance Coverages and Limits.

APPENDIX A

STANDARD CLAUSES FOR NEW YORK STATE CONTRACTS

PLEASE RETAIN THIS DOCUMENT
FOR FUTURE REFERENCE.

June 2023

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STANDARD CLAUSES FOR NYS CONTRACTS

The parties to the attached contract, license, lease, amendment or other agreement of any kind (hereinafter, "the contract" or "this contract") agree to be bound by the following clauses which are hereby made a part of the contract (the word "Contractor" herein refers to any party other than the State, whether a contractor, licenser, licensee, lessor, lessee or any other party):

1. EXECUTORY CLAUSE. In accordance with Section 41 of the State Finance Law, the State shall have no liability under this contract to the Contractor or to anyone else beyond funds appropriated and available for this contract.

2. NON-ASSIGNMENT CLAUSE. In accordance with Section 138 of the State Finance Law, this contract may not be assigned by the Contractor or its right, title or interest therein assigned, transferred, conveyed, sublet or otherwise disposed of without the State's previous written consent, and attempts to do so are null and void. Notwithstanding the foregoing, such prior written consent of an assignment of a contract let pursuant to Article XI of the State Finance Law may be waived at the discretion of the contracting agency and with the concurrence of the State Comptroller where the original contract was subject to the State Comptroller's approval, where the assignment is due to a reorganization, merger or consolidation of the Contractor's business entity or enterprise. The State retains its right to approve an assignment and to require that any Contractor demonstrate its responsibility to do business with the State. The Contractor may, however, assign its right to receive payments without the State's prior written consent unless this contract concerns Certificates of Participation pursuant to Article 5-A of the State Finance Law.

3. COMPTROLLER'S APPROVAL. In accordance with Section 112 of the State Finance Law, if this contract exceeds $50,000 (or $75,000 for State University of New York or City University of New York contracts for goods, services, construction and printing, and $150,000 for State University Health Care Facilities) or if this is an amendment for any amount to a contract which, as so amended, exceeds said statutory amount, or if, by this contract, the State agrees to give something other than money when the value or reasonably estimated value of such consideration exceeds $25,000, it shall not be valid, effective or binding upon the State until it has been approved by the State Comptroller and filed in his office. Comptroller's approval of contracts let by the Office of General Services, either for itself or its customer agencies by the Office of General Services Business Services Center, is required when such contracts exceed $85,000. Comptroller's approval of contracts established as centralized contracts through the Office of General Services is required when such contracts exceed $125,000, and when a purchase order or other procurement transaction issued under such centralized contract exceeds $200,000.

4. WORKERS' COMPENSATION BENEFITS. In accordance with Section 142 of the State Finance Law, this contract shall be void and of no force and effect unless the Contractor shall provide and maintain coverage during the life of this contract for the benefit of such employees as are required to be covered by the provisions of the Workers' Compensation Law.

5. NON-DISCRIMINATION REQUIREMENTS. To the extent required by Article 15 of the Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Contractor will not discriminate against any employee or applicant for employment, nor subject any individual to harassment, because of age, race, creed, color, national origin, citizenship or immigration status, sexual orientation, gender identity or expression, military status, sex, disability, predisposing genetic characteristics, familial status, marital status, or domestic violence victim status or because the individual has opposed any practices forbidden under the Human Rights Law or has filed a complaint, testified, or assisted in any proceeding under the Human Rights Law. Furthermore, in accordance with Section 220-e of the Labor Law, if this is a contract for the construction, alteration or repair of any public building or public work or for the manufacture, sale or distribution of materials, equipment or supplies, and to the extent that this contract shall be performed within the State of New York, Contractor agrees that neither it nor its subcontractors shall, by reason of race, creed, color, disability, sex, or national origin: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. If this is a building service contract as defined in Section 230 of the Labor Law, then, in accordance with Section 239 thereof, Contractor agrees that neither it nor its subcontractors shall by reason of race, creed, color, national origin, age, sex or disability: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. Contractor is subject to fines of $50.00 per person per day for any violation of Section 220-e or Section 239 as well as possible termination of this contract and forfeiture of all moneys due hereunder for a second or subsequent violation.

6. WAGE AND HOURS PROVISIONS. If this is a public work contract covered by Article 8 of the Labor Law or a building service contract covered by Article 9 thereof, neither Contractor's employees nor the employees of its subcontractors may be required or permitted to work more than the number of hours or days stated in said statutes, except as otherwise provided in the Labor Law and as set forth in prevailing wage and supplement schedules issued by the State Labor Department. Furthermore, Contractor and its subcontractors must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates for overtime pay, as determined by the State Labor Department in

accordance with the Labor Law. Additionally, effective April 28, 2008, if this is a public work contract covered by Article 8 of the Labor Law, the Contractor understands and agrees that the filing of payrolls in a manner consistent with Subdivision 3-a of Section 220 of the Labor Law shall be a condition precedent to payment by the State of any State approved sums due and owing for work done upon the project.

7. NON-COLLUSIVE BIDDING CERTIFICATION. In accordance with Section 139-d of the State Finance Law, if this contract was awarded based upon the submission of bids, Contractor affirms, under penalty of perjury, that its bid was arrived at independently and without collusion aimed at restricting competition. Contractor further affirms that, at the time Contractor submitted its bid, an authorized and responsible person executed and delivered to the State a non-collusive bidding certification on Contractor's behalf.

8. INTERNATIONAL BOYCOTT PROHIBITION. In accordance with Section 220-f of the Labor Law and Section 139-h of the State Finance Law, if this contract exceeds $5,000, the Contractor agrees, as a material condition of the contract, that neither the Contractor nor any substantially owned or affiliated person, firm, partnership or corporation has participated, is participating, or shall participate in an international boycott in violation of the federal Export Administration Act of 1979 (50 USC App. Sections 2401 et seq.) or regulations thereunder. If such Contractor, or any of the aforesaid affiliates of Contractor, is convicted or is otherwise found to have violated said laws or regulations upon the final determination of the United States Commerce Department or any other appropriate agency of the United States subsequent to the contract's execution, such contract, amendment or modification thereto shall be rendered forfeit and void. The Contractor shall so notify the State Comptroller within five (5) business days of such conviction, determination or disposition of appeal (2 NYCRR § 105.4).

9. SET-OFF RIGHTS. The State shall have all of its common law, equitable and statutory rights of set-off. These rights shall include, but not be limited to, the State's option to withhold for the purposes of set-off any moneys due to the Contractor under this contract up to any amounts due and owing to the State with regard to this contract, any other contract with any State department or agency, including any contract for a term commencing prior to the term of this contract, plus any amounts due and owing to the State for any other reason including, without limitation, tax delinquencies, fee delinquencies or monetary penalties relative thereto. The State shall exercise its set-off rights in accordance with normal State practices including, in cases of set-off pursuant to an audit, the finalization of such audit by the State agency, its representatives, or the State Comptroller.

10. RECORDS. The Contractor shall establish and maintain complete and accurate books, records, documents, accounts and other evidence directly pertinent to performance under this contract (hereinafter, collectively, the "Records"). The Records must be kept for the balance of the calendar year in which they were made and for six (6) additional years thereafter. The State Comptroller, the Attorney General and any other person or entity authorized to conduct an examination, as well as the agency or agencies involved in this contract, shall have access to the Records during normal business hours at an office of the Contractor within the State of New York or, if no such office is available, at a mutually agreeable and reasonable venue within the State, for the term specified above for the purposes of inspection, auditing and copying. The State shall take reasonable steps to protect from public disclosure any of the Records which are exempt from disclosure under Section 87 of the Public Officers Law (the "Statute") provided that: (i) the Contractor shall timely inform an appropriate State official, in writing, that said records should not be disclosed; and (ii) said records shall be sufficiently identified; and (iii) designation of said records as exempt under the Statute is reasonable. Nothing contained herein shall diminish, or in any way adversely affect, the State's right to discovery in any pending or future litigation.

11. IDENTIFYING INFORMATION AND PRIVACY NOTIFICATION. (a) Identification Number(s). Every invoice or New York State Claim for Payment submitted to a New York State agency by a payee, for payment for the sale of goods or services or for transactions (e.g., leases, easements, licenses, etc.) related to real or personal property must include the payee's identification number. The number is any or all of the following: (i) the payee's Federal employer identification number, (ii) the payee's Federal social security number, and/or (iii) the payee's Vendor Identification Number assigned by the Statewide Financial System. Failure to include such number or numbers may delay payment. Where the payee does not have such number or numbers, the payee, on its invoice or Claim for Payment, must give the reason or reasons why the payee does not have such number or numbers.

(b) Privacy Notification. (1) The authority to request the above personal information from a seller of goods or services or a lessor of real or personal property, and the authority to maintain such information, is found in Section 5 of the State Tax Law. Disclosure of this information by the seller or lessor to the State is mandatory. The principal purpose for which the information is collected is to enable the State to identify individuals, businesses and others who have been delinquent in filing tax returns or may have understated their tax liabilities and to generally identify persons affected by the taxes administered by the Commissioner of Taxation and Finance. The information will be used for tax administration purposes and for any other purpose authorized by law. (2) The personal information is requested by the purchasing unit of the agency contracting to purchase the goods or services or lease the real or personal property covered by this contract or lease. The information is maintained in the Statewide Financial System by the Vendor Management Unit within the Bureau of State Expenditures, Office of the State Comptroller, 110 State Street, Albany, New York 12236.

12. EQUAL EMPLOYMENT OPPORTUNITIES FOR MINORITIES AND WOMEN. In accordance with Section 312 of the Executive Law and 5 NYCRR Part 143, if this contract is: (i) a written agreement or purchase order instrument, providing for a total expenditure in excess of $25,000.00, whereby a contracting agency is committed to expend or does expend funds in return for labor, services, supplies, equipment, materials or any combination of the foregoing, to be performed for, or rendered or furnished to the contracting agency; or (ii) a written agreement in excess of $100,000.00 whereby a contracting agency is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon; or (iii) a written agreement in excess of $100,000.00 whereby the owner of a State assisted housing project is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon for such project, then the following shall apply and by signing this agreement the Contractor certifies and affirms that it is Contractor's equal employment opportunity policy that:

(a) The Contractor will not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability or marital status, shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on State contracts and will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination. Affirmative action shall mean recruitment, employment, job assignment, promotion, upgradings, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation;

(b) at the request of the contracting agency, the Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein; and

(c) the Contractor shall state, in all solicitations or advertisements for employees, that, in the performance of the State contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.

Contractor will include the provisions of "(a), (b) and (c)" above, in every subcontract over $25,000.00 for the construction, demolition, replacement, major repair, renovation, planning or design of real property and improvements thereon (the "Work") except where the Work is for the beneficial use of the Contractor. Section 312 does not apply to: (i) work, goods or services unrelated to this contract; or (ii) employment outside New York State. The State shall consider compliance by a contractor or subcontractor with the requirements of any federal law concerning equal employment opportunity which effectuates the purpose of this clause. The contracting agency shall determine whether the imposition of the requirements of the provisions hereof duplicate or conflict with any such federal law and if such duplication or conflict exists, the contracting agency shall waive the applicability of Section 312 to the extent of such duplication or conflict. Contractor will comply with all duly promulgated and lawful rules and regulations of the Department of Economic Development's Division of Minority and Women's Business Development pertaining hereto.

13. CONFLICTING TERMS. In the event of a conflict between the terms of the contract (including any and all attachments thereto and amendments thereof) and the terms of this Appendix A, the terms of this Appendix A shall control.

14. GOVERNING LAW. This contract shall be governed by the laws of the State of New York except where the Federal supremacy clause requires otherwise.

15. LATE PAYMENT. Timeliness of payment and any interest to be paid to Contractor for late payment shall be governed by Article 11-A of the State Finance Law to the extent required by law.

16. NO ARBITRATION. Disputes involving this contract, including the breach or alleged breach thereof, may not be submitted to binding arbitration (except where statutorily authorized), but must, instead, be heard in a court of competent jurisdiction of the State of New York.

17. SERVICE OF PROCESS. In addition to the methods of service allowed by the State Civil Practice Law & Rules ("CPLR"), Contractor hereby consents to service of process upon it by registered or certified mail, return receipt requested. Service hereunder shall be complete upon Contractor's actual receipt of process or upon the State's receipt of the return thereof by the United States Postal Service as refused or undeliverable. Contractor must promptly notify the State, in writing, of each and every change of address to which service of process can be made. Service by the State to the last known address shall be sufficient. Contractor will have thirty (30) calendar days after service hereunder is complete in which to respond.

18. PROHIBITION ON PURCHASE OF TROPICAL HARDWOODS. The Contractor certifies and warrants that all wood products to be used under this contract award will be in accordance with, but not limited to, the specifications and provisions of Section 165 of the State Finance Law, (Use of Tropical Hardwoods) which prohibits purchase and use of tropical hardwoods, unless specifically exempted, by the State or any governmental agency or political subdivision or public benefit corporation. Qualification for an exemption under this

law will be the responsibility of the contractor to establish to meet with the approval of the State.

In addition, when any portion of this contract involving the use of woods, whether supply or installation, is to be performed by any subcontractor, the prime Contractor will indicate and certify in the submitted bid proposal that the subcontractor has been informed and is in compliance with specifications and provisions regarding use of tropical hardwoods as detailed in § 165 State Finance Law. Any such use must meet with the approval of the State; otherwise, the bid may not be considered responsive. Under bidder certifications, proof of qualification for exemption will be the responsibility of the Contractor to meet with the approval of the State.

19. MACBRIDE FAIR EMPLOYMENT PRINCIPLES. In accordance with the MacBride Fair Employment Principles (Chapter 807 of the Laws of 1992), the Contractor hereby stipulates that the Contractor either (a) has no business operations in Northern Ireland, or (b) shall take lawful steps in good faith to conduct any business operations in Northern Ireland in accordance with the MacBride Fair Employment Principles (as described in Section 165 of the New York State Finance Law), and shall permit independent monitoring of compliance with such principles.

20. OMNIBUS PROCUREMENT ACT OF 1992. It is the policy of New York State to maximize opportunities for the participation of New York State business enterprises, including minority- and women-owned business enterprises as bidders, subcontractors and suppliers on its procurement contracts.

Information on the availability of New York State subcontractors and suppliers is available from:

NYS Department of Economic Development
Division for Small Business and Technology Development
625 Broadway
Albany, New York 12245
Telephone: 518-292-5100

A directory of certified minority- and women-owned business enterprises is available from:

NYS Department of Economic Development
Division of Minority and Women's Business Development
633 Third Avenue 33rd Floor
New York, NY 10017
646-846-7364
email: mwbebusinessdev@esd.ny.gov
https://ny.newnycontracts.com/FrontEnd/searchcertifieddirectory.asp

The Omnibus Procurement Act of 1992 (Chapter 844 of the Laws of 1992, codified in State Finance Law § 139-i and Public Authorities Law § 2879(3)(n)–(p)) requires that by signing this bid proposal or contract, as applicable, Contractors certify that whenever the total bid amount is greater than $1 million:

(a) The Contractor has made reasonable efforts to encourage the participation of New York State Business Enterprises as suppliers and subcontractors, including certified minority- and women-owned business enterprises, on this project, and has retained the documentation of these efforts to be provided upon request to the State;

(b) The Contractor has complied with the Federal Equal Opportunity Act of 1972 (P.L. 92-261), as amended;

(c) The Contractor agrees to make reasonable efforts to provide notification to New York State residents of employment opportunities on this project through listing any such positions with the Job Service Division of the New York State Department of Labor, or providing such notification in such manner as is consistent with existing collective bargaining contracts or agreements. The Contractor agrees to document these efforts and to provide said documentation to the State upon request; and

(d) The Contractor acknowledges notice that the State may seek to obtain offset credits from foreign countries as a result of this contract and agrees to cooperate with the State in these efforts.

21. RECIPROCITY AND SANCTIONS PROVISIONS. Bidders are hereby notified that if their principal place of business is located in a country, nation, province, state or political subdivision that penalizes New York State vendors, and if the goods or services they offer will be substantially produced or performed outside New York State, the Omnibus Procurement Act 1994 and 2000 amendments (Chapter 684 and Chapter 383, respectively, codified in State Finance Law § 165(6) and Public Authorities Law § 2879(5)) require that they be denied contracts which they would otherwise obtain. NOTE: As of May 2023, the list of discriminatory jurisdictions subject to this provision includes the states of South Carolina, Alaska, West Virginia, Wyoming, Louisiana and Hawaii.

22. COMPLIANCE WITH BREACH NOTIFICATION AND DATA SECURITY LAWS. Contractor shall comply with the provisions of the New York State Information Security Breach and Notification Act (General Business Law §§ 899-aa and 899-bb and State Technology Law § 208).

23. COMPLIANCE WITH CONSULTANT DISCLOSURE LAW. If this is a contract for consulting services, defined for purposes of this requirement to include analysis, evaluation, research, training, data processing, computer programming, engineering, environmental, health, and mental health services, accounting, auditing, paralegal, legal or similar services, then, in accordance with Section 163 (4)(g) of the State Finance Law (as amended by Chapter 10 of the Laws of 2006), the Contractor shall timely, accurately and properly comply with the requirement to submit an annual employment report for the contract to the agency that awarded the contract, the Department of Civil Service and the State Comptroller.

24. PROCUREMENT LOBBYING. To the extent this agreement is a "procurement contract" as defined by State Finance Law §§ 139-j and 139-k, by signing this agreement the contractor certifies and affirms that all disclosures made in accordance with State Finance Law §§ 139-j and 139-k are complete, true and accurate. In the event such certification is found to be intentionally false or intentionally incomplete, the State may terminate the agreement by providing written notification to the Contractor in accordance with the terms of the agreement.

25. CERTIFICATION OF REGISTRATION TO COLLECT SALES AND COMPENSATING USE TAX BY CERTAIN STATE CONTRACTORS, AFFILIATES AND SUBCONTRACTORS.
To the extent this agreement is a contract as defined by Tax Law § 5-a, if the contractor fails to make the certification required by Tax Law § 5-a or if during the term of the contract, the Department of Taxation and Finance or the covered agency, as defined by Tax Law § 5-a, discovers that the certification, made under penalty of perjury, is false, then such failure to file or false certification shall be a material breach of this contract and this contract may be terminated, by providing written notification to the Contractor in accordance with the terms of the agreement, if the covered agency determines that such action is in the best interest of the State.

26. IRAN DIVESTMENT ACT. By entering into this Agreement, Contractor certifies in accordance with State Finance Law § 165-a that it is not on the "Entities Determined to be Non-Responsive Bidders/Offerers pursuant to the New York State Iran Divestment Act of 2012" ("Prohibited Entities List") posted at: https://ogs.ny.gov/iran-divestment-act-2012

Contractor further certifies that it will not utilize on this Contract any subcontractor that is identified on the Prohibited Entities List. Contractor agrees that should it seek to renew or extend this Contract, it must provide the same certification at the time the Contract is renewed or extended. Contractor also agrees that any proposed Assignee of this Contract will be required to certify that it is not on the Prohibited Entities List before the contract assignment will be approved by the State.

During the term of the Contract, should the state agency receive information that a person (as defined in State Finance Law § 165-a) is in violation of the above-referenced certifications, the state agency will review such information and offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment activity which is in violation of the Act within 90 days after the determination of such violation, then the state agency shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, imposing sanctions, seeking compliance, recovering damages, or declaring the Contractor in default.

The state agency reserves the right to reject any bid, request for assignment, renewal or extension for an entity that appears on the Prohibited Entities List prior to the award, assignment, renewal or extension of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the Prohibited Entities list after contract award.

27. ADMISSIBILITY OF REPRODUCTION OF CONTRACT. Notwithstanding the best evidence rule or any other legal principle or rule of evidence to the contrary, the Contractor acknowledges and agrees that it waives any and all objections to the admissibility into evidence at any court proceeding or to the use at any examination before trial of an electronic reproduction of this contract, in the form approved by the State Comptroller, if such approval was required, regardless of whether the original of said contract is in existence.

PARTICIPATION BY MINORITY GROUP MEMBERS AND WOMEN WITH RESPECT TO STATE CONTRACTS: REQUIREMENTS AND PROCEDURES

I. General Provisions

A. The New York State Office of Parks, Recreation and Historic Preservation is required to implement the provisions of New York State Executive Law Article 15-A and 5 NYCRR Parts 140-145 ("MWBE Regulations") for all State contracts as defined therein, with a value (1) in excess of $25,000 for labor, services, equipment, materials, or any combination of the foregoing or (2) in excess of $100,000 for real property renovations and construction.

B. The Contractor to the subject contract (the "Contractor" and the "Contract," respectively) agrees, in addition to any other nondiscrimination provision of the Contract and at no additional cost to the New York State Office of Parks, Recreation and Historic Preservation, to fully comply and cooperate with the New York State Office of Parks, Recreation and Historic Preservation in the implementation of New York State Executive Law Article 15-A. These requirements include equal employment opportunities for minority group members and women ("EEO") and contracting opportunities for certified minority and women-owned business enterprises ("MWBEs"). The Contractor's demonstration of "good faith efforts" pursuant to 5 NYCRR § 142.8 shall be a part of these requirements. These provisions shall be deemed supplementary to, and not in lieu of, the nondiscrimination provisions required by New York State Executive Law Article 15 (the "Human Rights Law") or other applicable federal, state or local laws.

C. Failure to comply with all of the requirements herein may result in a finding of non-responsiveness, non-responsibility and/or a breach of contract, leading to the withholding of funds or such other actions, liquidated damages pursuant to Section VII of this Appendix or enforcement proceedings as allowed by the Contract.

II. Contract Goals

A. For purposes of this procurement, the New York State Office of Parks, Recreation and Historic Preservation hereby establishes New York State certified minority-owned business enterprises ("MBE") participation and New York State certified women-owned business enterprises ("WBE") participation (collectively, "MWBE Contract Goals") based on the current availability of qualified MBEs and WBEs as defined in the bidders documentation provided at the time of solicitation. After contract approval, MWBE Contract Goals as defined on the approved utilization plan will be endorsed to determine compliance for the contract term.

B. For purposes of providing meaningful participation by MWBEs on the Contract and achieving the MWBE Contract Goals established in Section II-A hereof, the Contractor should reference the directory of New York State Certified MBWEs found at the following internet address: https://ny.newnycontracts.com.

Additionally, the Contractor is encouraged to contact the Division of Minority and Woman Business Development ((518) 292-5250; (212) 803-2414; or (716) 846-8200) to discuss additional methods of maximizing participation by MWBEs on the Contract.

C. Where MWBE Contract Goals have been established herein, pursuant to 5 NYCRR § 142.8, the Contractor must document "good faith efforts" to provide meaningful participation by MWBEs as subcontractors or suppliers in the performance of the Contract. In accordance with Section 316-a of Article 15-A and 5 NYCRR § 142.13, the Contractor acknowledges that if it is found to have willfully and intentionally failed to comply with the MWBE participation goals set forth in the Contract, such a finding constitutes a breach of contract and the Contractor shall be liable to the New York State Office of Parks, Recreation and Historic Preservation for liquidated or other appropriate damages, as set forth herein.

III. Equal Employment Opportunity (EEO)

A. The provisions of Article 15-A of the Executive Law and the rules and regulations promulgated thereunder pertaining to equal employment opportunities for minority group members and women shall apply to the Contract.

B. In performing the Contract, the Contractor shall:

1. Ensure that each Contractor and subcontractor performing work on the Contract shall undertake or continue existing EEO programs to ensure that minority group members and women are afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status. For these purposes, EEO shall apply in the areas of recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation.
2. The Contractor shall submit an EEO policy statement to the New York State office of Parks, Recreation and Historic Preservation within seventy-two (72) hours after the date of the notice by the New York State Office of Parks, Recreation and Historic Preservation to award the Contract to the Contractor.
3. If the Contractor, or any of its subcontractors, does not have an existing EEO policy statement, the New York State office of Parks, Recreation and Historic Preservation may require the Contractor or subcontractor to adopt a model statement (see Form – Equal Employment Opportunity Policy Statement).
4. The Contractor's EEO policy statement shall include the following language:

    a. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, age, disability, or marital status, will undertake or continue existing EEO programs to ensure that minority group members and women are afforded equal employment opportunities without discrimination, and shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force.

b. The Contractor shall state in all solicitations or advertisements for employees that, in the performance of the contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.
c. The Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate on the basis of race, creed, color, national origin, sex age, disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein.
d. The Contractor will include the provisions of Subdivisions (a) through (c) of this Subsection 4 and Paragraph "E" of this Section III, which provides for relevant provisions of the Human Rights Law, in every subcontract in such a manner that the requirements of the subdivisions will be binding upon each subcontractor as to work in connection with the Contract.

C. Staffing Plan

To ensure compliance with this Section, for those contracts reaching $250,000 or greater, the Contractor shall submit a staffing plan to document the composition of the proposed workforce to be utilized in the performance of the Contract by the specified categories listed, including ethnic background, gender, and Federal occupational categories. The Contractor shall complete the Staffing plan form and submit it as part of their bid or proposal or within a reasonable time, but no later than the time of award of the contract.

D. Workforce Utilization Report

1. The Contractor shall submit a Workforce Utilization Report, and shall require each of its subcontractors to submit a Workforce Utilization Report, in such form as shall be required by the New York State Office of Parks, Recreation and Historic Preservation on a [MONTHLY/QUARTERLY] basis during the term of the Contract.
2. Separate forms shall be completed by the Contractor and any subcontractors.
3. Pursuant to Executive Order #162, Contractors and subcontractors are also required to report the gross wages paid to each of their employees for the work performed by such employees on the contract on a quarterly basis.

E. The Contractor shall comply with the provisions of the Human Rights Law, and all other State and Federal statutory and constitutional non-discrimination provisions. The Contractor and its subcontractors shall not discriminate against any employee or applicant for employment because of race, creed (religion), color, sex, national origin, sexual orientation, military status, age, disability, predisposing genetic characteristic, marital status or domestic violence victim status, and shall also follow the requirements of the Human Rights Law with regard to non-discrimination on the basis of prior criminal conviction and prior arrest.

IV. MWBE Utilization Plan

A. The Contractor represents and warrants that Contractor has submitted an MWBE Utilization Plan, by submitting evidence thereof through the New York State Contract System ("NYSCS"), which can be viewed at https://ny.newnycontracts.com, provided, however, that the Contractor may arrange to provide such evidence via a non-electronic method to the New York State Office of Parks, Recreation and Historic Preservation, either prior to, or at the time of, the execution of the contract.

B. The Contractor agrees to use such MWBE Utilization Plan for the performance of MWBEs on the Contract pursuant to the prescribed MWBE goals set forth in Section III-A of this Appendix.

C. The Contractor further agrees that a failure to submit and/or use such MWBE Utilization Plan shall constitute a material breach of the terms of the Contract. Upon the occurrence of such a material breach, New York State Office of Parks, Recreation and Historic Preservation shall be entitled to any remedy provided herein, including but not limited to, a finding of the Contractor non-responsiveness.

V. Waivers

A. For Waiver Requests, the Contractor should use the NYSCS, provided, however, that Bidder may arrange to provide such evidence via a non-electronic method to New York State Office of Parks, Recreation and Historic Preservation.

B. If the Contractor, after making good faith efforts, is unable to comply with MWBE goals, the Contractor may submit a Request for Waiver documenting good faith efforts by the Contractor to meet such goals. If the documentation included with the waiver request is complete, the New York State Office of Parks, Recreation and Historic Preservation shall evaluate the request and issue a written notice of acceptance or denial within twenty (20) days of receipt.

C. If the New York State Office of Parks, Recreation and Historic Preservation, upon review of the MWBE Utilization Plan and updated MWBE Contractor Compliance Reports determines that the Contractor is failing or refusing to comply with the MWBE Contract Goals and no waiver has been issued in regards to such non-compliance, the New York State Office of Parks, Recreation and Historic Preservation may issue a notice of deficiency to the Contractor. The Contractor must respond to the notice of deficiency within seven (7) business days of receipt. Such response may include a request for partial or total waiver of MWBE Contract Goals.

VI. MWBE Contractor Compliance Report

The Contractor is required to submit MWBE Contractor Compliance Reports through the NYSCS, provided, however, that Bidder may arrange to provide such evidence via a non-electronic method to the New York State Office of Parks, Recreation and Historic Preservation. Reports will be generated by the NYSCS for completion upon the generation of a payment to the Contractor. Reports should be completed for the term of the Contract documenting the progress made towards achievement of the MWBE goals of the Contract.

VII. Liquidated Damages - MWBE Participation

A. Where New York State Office of Parks, Recreation and Historic Preservation determines that the Contractor is not in compliance with the requirements of the Contract and the Contractor refuses to comply with such requirements, or if the Contractor is found to have willfully and intentionally failed to comply with the MWBE participation goals, the Contractor shall be obligated to pay to the New York State Office of Parks, Recreation and Historic Preservation liquidated damages.

B. Such liquidated damages shall be calculated as an amount equaling the difference between:
   1. All sums identified for payment to MWBEs had the Contractor achieved the contractual MWBE goals; and
   2. All sums actually paid to MWBEs for work performed or materials supplied under the Contract.

C. In the event a determination has been made which requires the payment of liquidated damages and such identified sums have not been withheld by the New York State Office of Parks, Recreation and Historic Preservation, the Contractor shall pay such liquidated damages to the New York State Office of Parks, Recreation and Historic Preservation within sixty (60) days after they are assessed by the New York State Office of Parks, Recreation and Historic Preservation unless prior to the expiration of such sixtieth day, the Contractor has filed a complaint with the Director of the Division of Minority and Woman Business Development pursuant to Subdivision 8 of Section 313 of the Executive Law in which event the liquidated damages shall be payable if the Director renders a decision in favor of the New York State Office of Parks, Recreation and Historic Preservation.

PARTICIPATION OPPORTUNITIES FOR NEW YORK STATE CERTIFIED SERVICE-DISABLED VETERAN OWNED BUSINESSES

Article 17-B of the New York State Executive Law provides for more meaningful participation in public procurement by certified Service-Disabled Veteran-Owned Businesses ("SDVOB"), thereby further integrating such businesses into New York State's economy. The New York State Office of Parks, Recreation and Historic Preservation recognizes the need to promote the employment of service-disabled veterans and to ensure that certified service-disabled veteran-owned businesses have opportunities for maximum feasible participation in the performance of the New York State Office of Parks, Recreation and Historic Preservation contracts.

In recognition of the service and sacrifices made by service-disabled veterans and in recognition of their economic activity in doing business in New York State, Bidders are expected to consider SDVOBs in the fulfillment of the requirements of the Contract. Such participation may be as subcontractors or suppliers, as protégés, or in other partnering or supporting roles.

I. Contract Goals

A. For purposes of this procurements, the New York State Office of Parks, Recreation and Historic Preservation hereby establishes SDVOB participation, based on the current availability of qualified SDVOB as defined in the bidder's documentation provided at the time of solicitation. For purposes of providing meaningful participation by SDVOBs, the Bidder/Contractor should reference the directory of New York State Certified SDVOBs found at: https://online.ogs.ny.gov/SDVOB/search Questions regarding compliance with SDVOB participation goals should be directed to the Minority Business Specialist, 518-486-2636. Additionally, following Contract execution, Contractor is encouraged to contact the Office of General Services' Division of Service-Disabled Veterans' Business Development at 518-474-2015 or VeteransDevelopment@ogs.ny.gov to discuss additional methods of maximizing participation by SDVOBs on the Contract.

B. Contractor must document "good faith efforts" to provide meaningful participation by SDVOBs as subcontractors or suppliers in the performance of the Contract (see clause IV below).

II. SDVOB Utilization Plan

A. In accordance with 9 NYCRR § 252.2(i), Contractors are required to submit a completed SDVOB Utilization Plan. This should be done utilizing the New York State Contracting system and the SDVOB Capital Construction Worksheet.

B. The Utilization Plan shall list the SDVOBs that the Bidder intends to use to perform the Contract, a description of the work that the Bidder intends the SDVOB to perform to meet the goals on the Contract, the estimated dollar amounts to be paid to an SDVOB, or, if not known, an estimate of the percentage of Contract work the SDVOB will perform. By signing the Utilization Plan, the Bidder acknowledges that making false representations or providing information that shows a lack of good faith as part of, or in

conjunction with, the submission of a Utilization Plan is prohibited by law and may result in penalties including, but not limited to, termination of a contract for cause, loss of eligibility to submit future bids, and/or withholding of payments. Any modifications or changes to the agreed participation by SDVOBs after the Contract award and during the term of the Contract must be reported on a revised SDVOB Utilization Plan and submitted to the New York State Office of Parks, Recreation and Historic Preservation.

C. The New York State Office of Parks, Recreation and Historic Preservation will review the submitted SDVOB Utilization Plan and advise the Contractor of the New York State Office of Parks, Recreation and Historic Preservation acceptance or issue a notice of deficiency within 20 days of receipt.

D. If a notice of deficiency is issued, Contractor agrees that it shall respond to the notice of deficiency, within seven business days of receipt, by submitting to the New York State Office of Parks, Recreation and Historic Preservation a written remedy in response to the notice of deficiency. If the written remedy that is submitted is not timely or is found by the New York State Office of Parks, Recreation and Historic Preservation to be inadequate, the New York State Office of Parks, Recreation and Historic Preservation shall notify the Contractor and direct the Contractor to submit, within five business days of notification by the New York State Office of Parks, Recreation and Historic Preservation, a request for a partial or total waiver of SDVOB participation goals. Failure to file the waiver form in a timely manner may be grounds for disqualification of the bid or proposal.

E. The New York State Office of Parks, Recreation and Historic Preservation may disqualify a Contractor's bid or proposal as being non-responsive under the following circumstances:

(a) If a Contractor fails to submit an SDVOB Utilization Plan;
(b) If a Contractor fails to submit a written remedy to a notice of deficiency;
(c) If a Contractor fails to submit a request for waiver; or
(d) If the New York State Office of Parks, Recreation and Historic Preservation determines that the Contractor has failed to document good faith efforts.

F. Contractor certifies that it will follow the submitted SDVOB Utilization Plan for the performance of SDVOBs on the Contract pursuant to the prescribed SDVOB contract goals set forth above.

G. Contractor further agrees that a failure to use SDVOBs as agreed in the Utilization Plan shall constitute a material breach of the terms of the Contract. Upon the occurrence of such a material breach, the New York State Office of Parks, Recreation and Historic Preservation shall be entitled to any remedy provided herein, including but not limited to, a finding of Contractor non-responsibility.

III. Request for Waiver

A. Prior to submission of a request for a partial or total waiver, Bidder/Contractor shall speak to the Minority Business Specialist 518-486-2636 for guidance.

B. In accordance with 9 NYCRR § 252.2(m), a Contractor that is able to document good faith efforts to meet the goal requirements, as set forth in clause IV below, may submit a request for a partial or total waiver on Form SDVOB 200, accompanied by supporting documentation. A Bidder may submit the request for waiver at the same time it submits its SDVOB Utilization Plan. If a request for waiver is submitted with the SDVOB Utilization Plan and is not accepted by the New York State Office of Parks, Recreation and Historic Preservation at that time, the provisions of clauses II (C), (D) & (E) will apply. If the documentation included with the Bidder's/Contractor's waiver request is complete, the New York State Office of Parks, Recreation and Historic Preservation shall evaluate the request and issue a written notice of acceptance or denial within 20 days of receipt.

C. Contractor shall attempt to utilize, in good faith, the SDVOBs identified within its SDVOB Utilization Plan, during the performance of the Contract. Requests for a partial or total waiver of established goal requirements made subsequent to Contract award may be made at any time during the term of the Contract to the New York State Office of Parks, Recreation and Historic Preservation, but must be made no later than prior to the submission of a request for final payment on the Contract.

D. If the New York State Office of Parks, Recreation and Historic Preservation, upon review of the SDVOB Utilization Plan and SDVOB Compliance Report determines that Contractor is failing or refusing to comply with the contract goals and no waiver has been issued in regards to such non-compliance, the New York State Office of Parks, Recreation and Historic Preservation may issue a notice of deficiency to the Contractor. The Contractor must respond to the notice of deficiency within seven business days of receipt. Such response may include a request for partial or total waiver of SDVOB contract goals.

Waiver requests should be sent to the New York State Office of Parks, Recreation and Historic Preservation.

IV. Required Good Faith Efforts

In accordance with 9 NYCRR § 252.2(n), Contractors must document their good faith efforts toward utilizing SDVOBs on the Contract. Evidence of required good faith efforts shall include, but not be limited to, the following:

(1) Copies of solicitations to SDVOBs and any responses thereto.

(2) Explanation of the specific reasons each SDVOB that responded to Bidders/Contractors' solicitation was not selected.

(3) Dates of any pre-bid, pre-award or other meetings attended by Contractor, if any, scheduled by the New York State Office of Parks, Recreation and Historic Preservation

with certified SDVOBs whom the New York State Office of Parks, Recreation and Historic Preservation determined were capable of fulfilling the SDVOB goals set in the Contract.

(4) Information describing the specific steps undertaken to reasonably structure the Contract scope of work for the purpose of subcontracting with, or obtaining supplies from, certified SDVOBs.

(5) Other information deemed relevant to the waiver request.

V. SDVOB Contractor Compliance Report

In accordance with 9 NYCRR § 252.2(q), Contractor is required to report SDVOB Contractor Compliance to the New York State Office of Parks, Recreation and Historic Preservation during the term of the Contract documenting progress made towards achieving the Contract SDVOB goals. This information must be submitted through the NYSCS. Reports will be generated by the NYSCS for completion upon the generation of a payment to the Contractor. Reports should be completed for the term of the Contract documenting the progress made towards achievement of the SDVOB goals of the Contract.

VI. Breach of Contract and Damages

In accordance with 9 NYCRR § 252.2(s), any Contractor found to have willfully and intentionally failed to comply with the SDVOB participation goals set forth in the Contract, shall be found to have breached the contract and Contractor shall pay damages as set forth therein.

Damages shall be calculated based on the actual cost incurred by the State agency related to the State agency's expenses for personnel, supplies and overhead related to establishing, monitoring, and reviewing certified service disabled veteran owned business enterprise programmatic goals.

Appendix C – Specific Insurance Coverages and Limits

The types of Insurance and minimum policy limits shall be as follows:

Workers' Compensation

For work to be performed in New York State, the Contractor shall provide and maintain full New York State (NYS listed in item 3A of the policy's Information Page) coverage during the life of the Contract for the benefit of such employees as are required to be covered by the New York State Workers' Compensation Law.

If the Contract involves work on or near a shoreline, or navigable waters (i.e. work in adjoining areas customarily used in the loading, unloading, repairing, or building of a vessel), a U.S. Longshore and Harbor Workers' Compensation Act and/or Jones Acts policy as applicable must be provided. Any waiver of this requirement must be approved by OPRHP and will only be granted in unique or unusual circumstances.

Evidence of Workers' Compensation and Employers Liability coverage must be provided on one of the following forms specified by the Chair of the New York State Workers' Compensation Board:

(1) C-105.2 (September 2007, or most current version) – Certificate of Workers' Compensation Insurance;

(2) U-26.3 – Certificate of Workers' Compensation Insurance from the State Insurance Fund;

(3) GSI-105/SI-12 – Certificate of Workers' Compensation Self-Insurance; or

(4) CE-200 – Attestation of Exemption – When Contractor meets the requirements.

All forms are valid for one year from the date the form is signed/ stamped, or until policy expiration, whichever is earlier.

Disability Benefits

For work to be performed in New York State, the Contractor shall provide and maintain coverage during the life of the Contract for the benefit of such employees as are required to be covered by the New York State Disability Benefits Law. Any waiver of this requirement must be approved by OPRHP and will only be granted in unique or unusual circumstances.

Evidence of Disability Benefits coverage must be provided on one of the following forms specified by the Chair of the Workers' Compensation Board:

(1) DB-120.1 (May 2006 or most current version) – Certificate of Insurance Coverage under the New York State Disability Benefits Law;

(2) DB-155 – Certificate of Disability Self-Insurance; or

(3) CE-200 – Certificate of Attestation of Exemption.

All forms are valid for one year from the date the form is signed/stamped, or until policy expiration, whichever is earlier.

Commercial General Liability

Commercial General Liability Insurance, (CGL) covering the liability of the Contractor for bodily injury, property damage, and personal and advertising Injury arising from all work and operations under the Contract, using form CG 00 01 or a policy providing equivalent coverage. The per occurrence and general aggregate limits under such policy shall not be less than the following based on the estimated value of the project:

Estimated Project Value	***Each Occurrence Limit***	***General Aggregate***
Less than $10 million	$2,000,000	$2,000,000
$10 million, up to and including $50 million	$5,000,000	$5,000,000
Over $50 million	$10,000,000	$10,000,000

Limits for other coverages under such policy, regardless of the estimated value of the project, shall be as follows:

- Products/Completed Operations – equal to amount of General Aggregate;
- Personal and Advertising Injury – $1,000,000;
- Damage to Rented Premises - $50,000; and
- Medical Expense – $5,000.

Coverage shall include, but not be limited to, the following:

- Premises liability;
- Independent contractors/subcontractors;
- Blanket contractual liability, including tort liability of another assumed in a contract;
- Defense and/or indemnification obligations, including obligations assumed under the contract;
- Cross liability for additional insureds;
- Products/completed operations for a term of no less than 3 years, commencing upon acceptance of the work, as required by the contract;
- Explosion, collapse, and underground hazards,
- Contractor means and methods; and
- liability resulting from section 240 or section 241 of the New York State Labor Law.

The CGL aggregate shall be endorsed to apply on a per project basis for construction contracts.

Contractor shall submit to OPRHP an Acord 25 Certificate of Liability Insurance and an Acord 855 Construction Certificate of Liability Insurance, or their successor forms, to document proof of the required coverages.

When the work involves construction or demolition within 50 feet of rail stations, yards, tracks, or other railroad property, the exclusion for work done within 50 feet of railroad property (the "Railroad" exclusion) must be deleted.

Commercial Automobile Liability

Commercial Auto Liability Insurance covering liability arising out of the use of any motor vehicle in connection with the Contract, including owned, leased, hired and non-owned vehicles bearing or, under the circumstances under which they are being used, required by the Motor Vehicle Laws of the State of New York to bear, license plates. Such policy shall have a combined single limit for Bodily Injury and Property Damage of at least $1,000,000. If the Contract involves the removal of hazardous waste or otherwise transporting hazardous materials, pollution liability coverage for covered automobiles shall be provided by form CA 01 12 03 06 and the Motor Carrier Act Endorsement (MCS-90) shall be attached.

If the Contractor does not own, lease or hire any motor vehicles used in connection with performance under this Contract, the Contractor need not obtain Comprehensive Automobile Liability Insurance, but must submit a written attestation stating that the Contractor does not own, lease or hire any automobiles used in connection with performance under this Contract. If Contractor later acquires, leases or hires, any automobiles that will be used in connection with performance under this Contract after this its effective date, the Contractor must obtain Comprehensive Automobile Liability Insurance that meets all of the requirements of this section and provide proof of such coverage to OPRHP within fifteen (15) days following the date the coverage is bound.

Notwithstanding the foregoing, in the event that the Contractor does not own or lease any motor vehicles used in connection with the performance under this Contract, but the Contractor does hire and/or utilize non-owned motor vehicles in connection with performance under this Contract, the Contractor must: (1) obtain Commercial Automobile Liability Insurance as required by this section, except that such insurance may be limited to liability arising out of hired and/or non-owned automobiles, as applicable; and (2) submit a written attestation stating that the Contractor does not own or lease any automobiles used in connection with performance under this Contract. If Contractor later acquires or leases any motor vehicles that will be used in connection with performance under this Contract, the Contractor must obtain Commercial Automobile Liability Insurance that meets all the requirements of this section and provide proof of such coverage to OPRHP within fifteen (15) days following the date the coverage is bound.

Umbrella and Excess Liability Policies

When the limits of the any Liability policies procured are insufficient to meet the limits specified, the Contractor shall procure and maintain commercial Umbrella and/or Excess Liability policies with limits in excess of the primary; provided, however, that the total amount of Insurance coverage is at least equal to the requirements for that Liability policy as set forth in this section. Such Umbrella and/or Excess Liability policies shall provide coverage at least as broad as the underlying policies and must be endorsed to be primary with respect to the coverage afforded the Additional Insureds. Any Insurance maintained by OPRHP or any Additional Insured shall be considered excess of and shall not contribute with any other Insurance procured and maintained by the Contractor including primary, Umbrella and Excess Liability Policies regardless of the other Insurance clause contained in either parties' policy.

Builder's Risk Insurance

The Contractor shall provide a Builder's Risk Insurance policy in completed value form. Such policy shall cover the total value of the work performed in accordance with the Contract, as well as the value of any equipment, supplies and/or material to be installed in the project that may be in storage (on or off the site) or in transit. The policy shall cover the cost of removing debris, including demolition as may be legally necessary by the operation of any law, ordinance or regulation, and property of the State held in its care, custody and/or control. The Builder's Risk Insurance policy shall contain endorsements that provide for the following:

- The State and the Contractor shall be named as loss Payees for the work in order of precedence, as their interest may appear; and
- In the event the loss occurs at an occupied facility, the policy shall contract occupancy without the consent of the Insurer; and
- In the event that the insurance policy has been issued by a mutual insurance company, the following language shall be included: the "New York State Office of Parks, Recreation and Historic Preservation is not liable for any premium or assessment under this policy of Insurance. The First Named Insured is solely liable therefor."

Environmental Liability

Contractor's Pollution Liability (CPL)

If the work performed under the Contract involves abatement, handling, removal, repair, replacement, enclosure, encapsulation and/or disposal of any pollutants, which includes but are not limited to, petroleum, petroleum product, hazardous materials or substances including asbestos, lead, fungus and those as defined by applicable State and federal laws and regulations, and the need to monitor, clean up, remove, contain, treat, detoxify, or assess the effects of a pollution-related event or condition, the Contractor shall procure, or otherwise obtain through an approved subcontractor, and maintain in full force and effect throughout the term of the Contract, and for two years after the work's completion,

Contractor's Pollution Liability (CPL) Insurance, including coverage for non-owned disposal sites. The limits of such CPL Policy shall not be less than: 1) $2,000,000, if the value of work to be performed under the Contract is less than $10 million, 2) $5,000,000, if the value of the work to be performed under the Contract is $10 million or more and up to and including $50 million, or 3) $10,000,000 if the value of the work to be performed under the Contract is more than $50 million. Such CPL policy shall provide coverage for bodily injury and property damage, including loss of use of damaged property or of property that has not been physically injured and for actual, alleged or threatened emission, discharge, dispersal, seepage, release or escape of pollutants, including any loss, cost or expense incurred as a result of any cleanup of pollutants or in the investigation, settlement or defense of any claim, suit, or proceedings against OPRHP arising from the Contractor's work.

This requirement applies to mold as well, if excluded in the Commercial General Liability Insurance policy.

If automobiles are to be used for transporting hazardous materials, the Contractor shall provide pollution liability broadened coverage for covered automobiles (Endorsement CA 01 12 or its equivalent) as well as proof of MCS-90.

Pollution Legal Liability (PLL)

If any work performed under the Contract includes operations that could involve the release of pollutants, Contractor shall procure and maintain Pollution Legal Liability (PLL) Insurance providing coverage for bodily injury, property damage or environmental contamination, including natural resource damage, resulting from the release of any pollutants from property Contractor owns, leases, or operates. Such policy shall provide coverage for actual, alleged or threatened emission, discharge, dispersal, seepage, release or escape of pollutants, including any loss, cost or expense incurred as a result of any cleanup of pollutants or in the investigation, settlement or defense of any claim, suit or proceedings against the insured, Additional Insureds, including OPRHP, or any authorized user arising from the Contractor's or their subcontractor's operations, with limits not less than $1,000,000 per claim. If automobiles are to be used for transporting hazardous materials, the Contractor shall provide pollution liability broadened coverage for covered autos (endorsement CA 99 48 03 06 or CA 01 12 03 06) as well as proof of MCS 90.

Aviation Liability

If any of the work performed under this Contract involves the use or operation of an aircraft, including but not limited to unmanned aircraft systems, Aviation Liability Insurance is required covering the liability of the owner and operator for bodily injury, property damage, and personal injury arising from all operation in the amount of at least $1,000,000 per Occurrence. If applicable, such Aviation Liability Insurance policy shall also protect against risk involving passengers, pilots, crew members, baggage, and cargo carried on the aircraft, including medical coverage for passengers, pilots and crew members; and damage to individuals or property outside aircraft itself with a liability limit of at least $1,000,000 each occurrence and $100,000 passenger liability.

Railroad Protective Liability Insurance

In the event that any work under the Contract is to be performed on or within 50 ft. of railroad property or a railroad right-of-way, the Contractor shall provide and maintain a Railroad Protective Liability (RPL) Insurance Policy in the amounts required by the respective railroad.

The policy must name the Railroad as the Named Insured. No Additional Insureds can be listed on the policy (see requirements for the deletion of the 50' Railroad Exclusion on the Commercial General Liability policy), and the definition of "physical damage to property" must be amended to mean direct and accidental loss of or damage to "all property of any Named Insured and all property in any Named Insured's care, custody or control."

Evidence of Railroad Protective Liability Insurance must be provided on the Certificate of Insurance, and a detailed Binder pending issuance of the policy, or on an ISO-RIMA or equivalent form approved by the railroad, and meet any other requirements as specified by the railroad and or OPRHP.

Professional Liability Insurance/Errors and Omissions Liability Insurance

If any work under the Contract involves professional design services in which any negligent act, error, or omission in the rendering of or failure to render may result in claims of financial loss, bodily injury, property damage, or personal injury, the Contractor and any subcontractor retained by the Contractor and providing such professional services, shall procure and maintain during and for a period of three (3) years after completion of the work provided under the Contract, Professional Liability Insurance/Errors and Omissions Liability Insurance issued to and covering damage for liability imposed on the Contractor by the Contract or law arising out of any negligent act, error, or omission in the render of or failure to render professional design services required by the Contract. The limits of such policy shall not be less than $2,000,000 each occurrence, if the value of work to be performed under the Contract is less than $25 million, or 2) $5,000,000 each occurrence, if the value of the work to be performed under the Contract is $25 million or more. Such policies do not require an Additional Insured endorsement.

Kathy Hochul, Governor

Roberta Reardon, Commissioner

NYS OPRHP

Dawn Barker
6105 E Seneca Turnpike
Jamesville NY 13078

Schedule Year	2026 through 2027
Date Requested	09/18/2026
PRC#	2026027316

Location	Robert H. Treman State Park
Project ID#	D006612,13 14,15
Project Type	New restroom building, site work, electric service upgrade.

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Rate Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2026 through June 2027. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Contractor Registry

Effective December 30, 2024 all contractors and subcontractors submitting bids or performing construction work on public work projects, or private projects covered by Article 8 of the Labor Law, are required to register with the New York State Department of Labor (NYSDOL) under Labor Law Section 220-i. To register, contractors and subcontractors must submit an application through NYSDOL's Contractor Registry portal which is available through the agency's Management System for Protecting Worker Rights (MPWR) https://mpwr-public.labor.ny.gov/en/login.

For additional information, please visit online.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission: a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion online.

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule form the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12226; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website

www.labor.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemperaneous, true, and accurate payroll records. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provided, and Daily and weekly number of hours worked in each classification.

The filing of payrolls to the Department of Jurisdiction is a condition of payment.Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, but are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed $100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds $25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The "Public Work Project" notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers. compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers. Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeyworkers in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above or is performing work outside the classification of work for which the apprentice is indentured, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12226 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of $50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.

Kathy Hochul, Governor

Roberta Reardon, Commissioner

NYS OPRHP

Dawn Barker
6105 E Seneca Turnpike
Jamesville NY 13078

Schedule Year	2026 through 2027
Date Requested	09/18/2026
PRC#	2026027316

Location	Robert H. Treman State Park
Project ID#	D006612,13 14,15
Project Type	New restroom building, site work, electric service upgrade.

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information

All information must be supplied

Federal Employer Identification Number: _____

Name: _____

Address: _____

_____

City: _____ State: _____ Zip: _____

Amount of Contract: $_____

Approximate Starting Date: ____/____/____

Approximate Completion Date: ____/____/____

Contract Type:

[ ] (01) General Construction
[ ] (02) Heating/Ventilation
[ ] (03) Electrical
[ ] (04) Plumbing
[ ] (05) Other : _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12226

Social Security Numbers on Certified Payrolls:

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concern regarding inclusion of this information on payrolls if another identifier will suffice.

For these reasons, the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

Construction Industry Fair Play Act: Required Posting for Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site. Failure to post the notice can result in penalties of up to $1,500 for a first offense and up to $5,000 for a second offense. The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, https://dol.ny.gov/public-work-and-prevailing-wage
If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.ny.gov .

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

Effective June 23, 2020

This provision is an addition to the existing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage and supplement rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her job classification. The required notification will be provided with each wage schedule, may be downloaded from our website *www.labor.ny.gov* or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(12.20)

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

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1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12226

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.

Required Notice under Article 25-B of the Labor Law

Attention All Employees, Contractors and Subcontractors: You are Covered by the Construction Industry Fair Play Act

The law says that you are an employee unless:

- You are free from direction and control in performing your job, **and**
- You perform work that is not part of the usual work done by the business that hired you, **and**
- You have an independently established business.

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

It is against the law for an employer to misclassify employees as independent contractors or pay employees off the books.

Employee Rights: If you are an employee, you are entitled to state and federal worker protections. These include:

- Unemployment Insurance benefits, if you are unemployed through no fault of your own, able to work, and otherwise qualified,
- Workers' compensation benefits for on-the-job injuries,
- Payment for wages earned, minimum wage, and overtime (under certain conditions),
- Prevailing wages on public work projects,
- The provisions of the National Labor Relations Act, and
- A safe work environment.

It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor**, you must pay all taxes and Unemployment Insurance contributions required by New York State and Federal Law.**

Penalties for paying workers off the books or improperly treating employees as independent contractors:

- **Civil Penalty** — First offense: Up to $2,500 per employee

  Subsequent offense(s): Up to $5,000 per employee

- **Criminal Penalty** — First offense: Misdemeanor - up to 30 days in jail, up to a $25,000 fine and debarment from performing public work for up to one year.

  Subsequent offense(s): Misdemeanor - up to 60 days in jail or up to a $50,000 fine and debarment from performing public work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at (866) 435-1499 or send an email to dol.misclassified@labor.ny.gov. All complaints of fraud and violations are taken seriously. You can remain anonymous.

Employer Name:

WE ARE YOUR DOL

New York State Department of Labor
Bureau of Public Work

Attention Employees

THIS IS A:

PUBLIC WORK PROJECT

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Your pay stub and wage notice received upon hire must clearly state your wage rate and supplement rate.

Chapter 629 of the Labor Laws of 2007:

These wages are set by law and must be posted at the work site. They can also be found at:
https://dol.ny.gov/bureau-public-work

If you feel that you have not received proper wages or benefits, please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5287		

* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is $250,000.00 or more the contract must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training "prior to the performing any work on the project."

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- ≠ Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.)*
- ≠ Training roster, attendance record of other documentation from the certified trainer pending the issuance of the card.
- ≠ Other valid proof

**A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-457-5589.

WICKS

Public work projects are subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work, when the total project's threshold is $3 million in Bronx, Kings, New York, Queens and, Richmond counties; $1.5 million in Nassau, Suffolk and Westchester counties; and $500,000 in all other counties.

For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or the use of a Project Labor Agreement (PLA), and must be open to public inspection.

Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.

The Commissioner of Labor shall have the power to enforce separate specification requirement s on projects, and may issue stop-bid orders against public owners for non-compliance.

Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.

Contractors must pay subcontractors within a 7 days period.

(07.19)

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.
Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.
Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.
Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

*Contractor Registry (LL 220-I):
Labor Law Section 220-i requires that contractors obtain a Contractor Registry certificate of registration prior to bidding on or commencing work on a public or private project subject to prevailing wage requirements. Subcontractors also are prohibited from commencing work on covered employment unless they have received a Contractor Registry certificate. Contractors are required to submit their Certificate of Registration with their bid materials. A public database is available online to confirm registration at data.ny.gov to confirm registration validity. For additional information on how to register and the requirements, visit https://dol.ny.gov/public-work-contractor-and-subcontractorregistry-
landing.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. Payrolls must be maintained for at least three (3) years from the projects date of completion. Additionally, as per Article 6 of the Labor Law, contractors and subcontractors are required to establish, maintain, and preserve for not less that six (6) years, contemporaneous, true, and accurate payroll records.

At a minimum, payrolls must show the following information for each person employed on a public work project: Name; Address, Last 4 Digits of Social Security number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provided, and Daily and weekly number of hours worked in each classification.

Payroll records and transcripts are required to be kept on site during all the time that work under that contract is being performed.

NOTE: *For more detailed information regarding Article 9 prevailing wage contracts, please refer to "General Provisions of Laws Covering Workers on Article 9 Public Work Building Service Contracts".*

If you have any questions concerning the attached schedule or would like additional information, please write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12240

OR

Contact the nearest BUREAU of PUBLIC WORK District Office

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518

Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. The specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. Please Note: Updates to the Wage Schedule shall be made on a quarterly basis.

All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.ny.gov) for current wage rate information.

Shift Work

If the timeline of the contract requires shift work be performed to meet deadlines, the BPWE will enforce the shift work rate as the required rate on the project whether or not shift work is specifically addressed in the contract.

Paid Prenatal Leave

Every employer shall be required to provide to its employees twenty hours of paid prenatal personal leave during any fifty-two week calendar period. Paid prenatal personal leave shall mean leave taken for the health care services received by an employee during their pregnancy or related to such pregnancy, including physical examinations, medical procedures, monitoring and testing, and discussions with a healthcare provider related to the pregnancy. Paid prenatal personal leave may be taken in hourly increments. Benefits for paid prenatal personal leave shall be paid in hourly installments. Employees shall receive compensation at the employee's regular rate of pay, or the applicable minimum wage established by the labor law, whichever is greater, for the use of Paid Prenatal leave.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4

Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12226

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Tompkins County General Construction

Boilermaker 09/01/2026

JOB DESCRIPTION Boilermaker **DISTRICT** 7

ENTIRE COUNTIES
Cayuga, Clinton, Cortland, Franklin, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, Seneca, St. Lawrence, Tompkins

WAGES

Per hour:	07/01/2026	01/01/2027 Additional
Boilermaker	$ 42.50	$ 2.50*

* To be allocated at a later date.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 27.10* + 1.49

*This portion of the benefits subject to the same premium rate as shown for overtime wages.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 25) on HOLIDAY PAGE
NOTE: When a holiday falls on Sunday, the day observed by the State or Nation shall be observed. When a holiday falls on Saturday, Friday will be observed as the holiday.

REGISTERED APPRENTICES
WAGES per hour: Six (6) month terms at the following percentage of Journeyworker's wage.

1st	2nd	3rd	4th	5th	6th	7th	8th
65%	65%	70%	75%	80%	85%	90%	95%

SUPPLEMENTAL BENEFITS per hour:

$ 20.09* + 1.49	$ 20.09* + 1.49	$ 21.09* + 1.49	$ 22.08* + 1.49	$ 23.07* + 1.49	$ 24.09* + 1.49	$ 25.11* + 1.49	$ 26.10* + 1.49

*This portion of the benefits subject to the same premium rate as shown for overtime wages.

7-175

Broadband 09/01/2026

JOB DESCRIPTION Broadband **DISTRICT** 4

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Orange: Only in the Village of Greenwood Lake, Village of Highland Falls, Town of Tuxedo, and Town of Patterson

WAGES
NOTE: Applies to all public work and covered private projects, including those receiving ConnectAll funding subject to New York State Labor Law §224-E, solicited on or after July 1,2025. For all other projects solicited prior to July 1,2025 please see LINEMAN ELECTRICIAN(1)-TELEDATA

Per Hour:	07/01/2026	08/04/2026
Field Tech Install/Repair*	$ 52.85	$ 54.44

For outside work (excluding installation on building construction/alteration/renovation projects), stopping at first point of attachment (demarcation), installing/maintaining/repairing broadband internet service.

"Broadband", "Broadband Service", or "Broadband Internet" means mass-market retail service by wire or radio that provides the capability to transmit data to and receive data from all or substantially all internet endpoints, including any capabilities that are incidental to and enable the operation of the communications service, but excluding dial-up internet access service.

*NOTE: EXCLUDES work within ten(10) feet of High Voltage (600 Volts and over) transmission lines. Please see LINEMAN rates.
*NOTE: Does not include the operation of equipment. Please see applicable OPERATING ENGINEER rates.
*NOTE: Does not include Groundmen/Flagger/Flagmen. Please see LABORER/LABORER-HEAVY/HIGHWAY rates.

SUPPLEMENTAL BENEFITS
Per Hour:
$ 23.24

OVERTIME PAY
See (B, K, *R) on OVERTIME PAGE
* Two and one half times the hourly rate after the 8th hour

HOLIDAY
Paid: See (5, 6, 7, 11, 12) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 12) on HOLIDAY PAGE

4-CWA-Dist2

Carpenter - Building 09/01/2026

JOB DESCRIPTION Carpenter - Building **DISTRICT** 2

ENTIRE COUNTIES
Chemung, Cortland, Schuyler, Steuben, Tompkins

PARTIAL COUNTIES
Allegany: Only the Township of Alfred.

WAGES

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional
Carpenter	$ 35.09	$ 4.00*	$3.00*
Floor Coverer	35.09	4.00*	3.00*
Carpet Layer	35.09	4.00*	3.00*
Dry-Wall	35.09	4.00*	3.00*
Diver-Wet Day	61.25	4.00*	3.00*
Diver -Dry Day	36.09	4.00*	3.00*
Diver Tender	36.09	4.00*	3.00*

*To be allocated at a later date

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):
- Pile Drivers/Dock Builders shall receive $0.25 per hour over the journeyworker's rate of pay when performing piledriving/dock building work.
- Certified welders shall receive $3.00 per hour over the journeyworker's rate of pay when the employee is required to be certified and performs DOT or ABS specified welding work.
- When an employee performs work within a contaminated area on a State and/or Federally designated hazardous waste site, and where relevant State and/or Federal regulations require employees to be furnished and use or wear required forms of personal protection, then the employee shall receive thier regular hourly rate plus $1.50 per hour.
- Depth pay for Divers based upon deepest depth on the day of the dive (per diem payment):
  0' to 80' no additional fee
  81'to 100' additional $.50 per foot
  101'to 150' additional $0.75 per foot
  151'and deeper additional $1.25 per foot
- Penetration pay for Divers based upon deepest penetration on the day of the dive (per diem payment):
  0' to 50' no additional fee
  51' to 100' additional $.75 per foot
  101' and deeper additional $1.00 per foot
- Diver rates applies to all hours worked on dive day.

SHIFT WORK
On Agency/Owner mandated shift work, the following rates will be applicable:
1st Shift - Regular Rate
2nd Shift - Premium of 10% of base wage per hour
3rd Shift - Premium of 15% of base wage per hour
Shift work shall be defined as implementing at least two (2) shifts in a twenty-four (24) consecutive hour period. Shift work must be for a minimum of three (3) consecutive days.

SUPPLEMENTAL BENEFITS
Per hour:

	07/01/2026
Journeyworker	$ 23.89

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: Any holiday which occurs on Sunday shall be observed the following Monday. If Christmas falls on a Saturday, it shall be observed on the prior Friday.

REGISTERED APPRENTICES
Wages per hour (1300 hour terms at the following percentage of Journeyworker's base wage):

1st	2nd	3rd	4th
65%	70%	75%	80%

Supplemental Benefits per hour:

$ 13.05	$ 13.05	$ 15.65	$ 15.65

NOTE ADDITIONAL AMOUNTS PAID TO APPRENTICES FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):
- Pile Driving/Dock Builder apprentices shall receive an additional $0.25 per hour worked when performing piledriving/dock building work.
- Certified Welders shall receive $3.00 per hour over the apprentices rate of pay when the apprentice is required to be certified and performs DOT, AWS or ABS specified welding work.
- When an apprentice performs work within a contaminated area on a State and/or Federally designated hazardous waste site, and where relevant State and/or Federal regulations require the apprentice to be furnished and use or wear required forms of personal protection, then the apprentice shall receive their regular hourly rate plus $1.50 per hour.

2-277B-CS

Carpenter - Building / Heavy&Highway 09/01/2026

JOB DESCRIPTION Carpenter - Building / Heavy&Highway **DISTRICT** 2

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Orange: The area lying on Northern side of Orange County demarcated by a line drawn from the Bear Mountain Bridge continuing west to the Bear Mountain Circle, continue North on 9W to the town of Cornwall where County Road 107 (also known as Quaker Rd) crosses under 9W, then east on County Road 107 to Route 32, then north on Route 32 to Orrs Mills Rd, then west on Orrs Mills Rd to Route 94, continue west and south on Route 94 to the Town of Chester, to the intersection of Kings Highway, continue south on Kings Highway to Bellvale Rd, west on Bellvale Rd to Bellvale Lakes Rd, then south on Bellvale Lakes Rd to Kain Rd, southeast on Kain Rd to Route 17A, then north and southeast along Route 17A to Route 210, then follow Route 210 to NJ Border.

WAGES

Wages per hour:	07/01/2026	07/01/2027 Additional
Carpenter - ONLY for Artificial Turf/Synthetic Sport Surface	$ 39.69	$ 2.25*

*To be allocated at a later date.

Note - Does not include the operation of equipment. Please see Operating Engineers rates.

SUPPLEMENTAL BENEFITS
Per hour worked:

Journeyworker	$ 27.84

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE
Notes:
When a holiday falls upon a Saturday, it shall be observed on the preceding Friday. Whan a holiday falls upon a Sunday, it shall be observed on the following Monday.
An employee taking an unexcused day off the regularly scheduled day before or after a paid Holiday shall not receive Holiday pay.

REGISTERED APPRENTICES

Wages per hour (1300 hour terms at the following percentage of Journeyworker's wage):

1st	2nd	3rd	4th
65%	70%	75%	80%

Supplemental Benefits per hour worked:

$ 19.08	$ 19.69	$ 21.86	$ 22.47

2-42AtSS

Carpenter - Heavy&Highway 09/01/2026

JOB DESCRIPTION Carpenter - Heavy&Highway **DISTRICT** 2

ENTIRE COUNTIES
Broome, Cayuga, Chemung, Cortland, Delaware, Jefferson, Lewis, Onondaga, Oswego, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Yates

WAGES

Per hour	07/01/2026	07/01/2027 Additional
Carpenter	$ 41.02	$ 4.42*
Piledriver	41.02	4.42*
Dockbuilder	41.02	4.42*
Diver-Wet Day	66.02	4.42*
Diver-Dry Day	42.02	4.42*
Diver-Tender	42.02	4.42*

*To be allocated at a later date.

NOTE ADDITIONAL AMOUNTS PAID FOR THE FOLLOWING WORK LISTED BELOW (per hour worked):
- State or Federal designated hazardous site, requiring protective gear shall be an additional $2.50 per hour.
- Certified welders when required to perform welding work will receive an additional $5.00 per hour.

ADDITIONAL NOTES PERTAINING TO DIVERS/TENDERS:
- Divers and Tenders shall receive one and one half (1 1/2) times their regular diver and tender rate of pay for Effluent and Slurry diving.
- Divers and tenders being paid at the specified rate for Effluent and Slurry diving shall have all overtime rates based on the specified rate plus the appropriate overtime rates (one and one half or two times the specified rate for Slurry and Effluent divers and tenders).
- The pilot of an ADS or submersible will receive one and one-half (1 1/2) times the Diver-Wet Day Rate for time submerged.
- All crew members aboard a submersible shall receive the Diver-Wet Day rate.
- Depth pay for Divers based upon deepest depth on the day of the dive (per diem payment):
  - 0' to 50' no additional fee
  - 51' to 100' additional $0.50 per foot
  - 101' to 150' additional $0.75 per foot
  - 151' to 200' additional $1.25 per foot
  - 201' and deeper additional $1.50 per foot
- Penetration pay for Divers based upon deepest penetration on the day of the dive (per diem payment):
  - 0' to 50' no additional fee
  - 51' to 100' additional $0.75 per foot
  - 101' to 200' additional $1.00 per foot
  - Over 201' additional $1.25 per foot
- Diver rates applies to all hours worked on dive day.

SHIFT WORK
When project owner mandates a single irregular work shift, the Journeyworkers and Apprentices will receive an additional $4.00 per hour. A single irregular work shift can start any time from 5:00 p.m. to 1:00 a.m.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 27.81

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
- In the event a Holiday falls on a Saturday, the Friday before will be observed as a Holiday. If a Holiday falls on a Sunday, then Monday will be observed as a Holiday.
- The employee must work their scheduled workday before and their scheduled workday after the holiday to receive holiday pay.

REGISTERED APPRENTICES
CARPENTER/PILEDRIVER/DOCKBUILDER APPRENTICES
Wages per hour (1300 hour terms at the following percentage of journeyworker's base wage):

1st	2nd	3rd	4th

65%	70%	75%	80%
Supplemental Benefits per hour:			
$ 19.05	$ 19.66	$ 21.78	$ 22.39

NOTE ADDITIONAL AMOUNTS PAID PER HOUR WORKED TO APPRENTICES FOR SPECIFIC TYPES OF WORK PERFORMED:
- State or Federal designated hazardous site, requiring protective gear shall be an additional $2.50 per hour.
- Certified welders when required to perform welding work will receive an additional $5.00 per hour.

2-277HH-Bro

Electrician 09/01/2026

JOB DESCRIPTION Electrician **DISTRICT** 6

ENTIRE COUNTIES
Cortland, Herkimer, Madison, Oneida, Oswego

PARTIAL COUNTIES
Cayuga: Townships of Ira, Locke, Sempronius, Sterling, Summerhill and Victory.
Chenango: Only the Townships of Columbus, New Berlin and Sherburne.
Onondaga: Entire County except Townships of Elbridge and Skaneateles.
Otsego: Only the Townships of Plainfield, Richfield, Springfield, Cherry Valley, Roseboom, Middlefield, Otsego, Exeter, Edmeston, Burlington, Pittsfield and New Lisbon.
Tompkins: Only the Township of Groton.
Wayne: Only the Townships of Huron, Wolcott, Rose and Butler.

WAGES

Per hour:	07/01/2026
Electrician	$ 54.00
Teledata	54.00
Cable Splicer	59.40

NOTE: Additional amounts, subject to overtime premiums, due for the following work (applicable to all employees):
- Additional $ 2.50 per hour for work performed over 35 feet above the ground, floor, or roof levels or where work is required in tunnels, shafts, or under compressed air 35 feet below the ground level.
- Additional $ 3.00 per hour for working over 50 feet above or below ground, floor, or roof level. This includes work on ladders, "toothpicks", scaffolds, boatswain chairs, towers, smokestacks or other open structures. Also applies to working from mechanical lifts when used above 60 feet.

Occupied Conditions: When necessary to perform alteration and/or renovation work and owner mandates (due to occupied conditions) prevent the work from being performed during "normal" working hours (defined as between 6:00 AM and 4:30 PM Monday through Friday), alternate hours may be worked, provided: 1) The hours are established for a minimum of five (5) days duration or the length of the job, whichever is shorter; and 2) An entire work scope within a job-site area is performed utilizing the varied hours. If these conditions are satisfied, all hours worked Monday through Friday of a shift that starts before or ends after the "normal" hours, shall be paid at the appropriate rate plus fifteen percent (15%). However, the following restrictions apply:

1) "Alternate" hours shall consist of a minimum of eight (8) consecutive hours per day.
2) Hours worked in excess of eight (8) hours per day, Monday through Friday, shall be paid at a rate of one and one-half times the applicable rate (dayshift + 15%).
3) Hours worked on Saturday shall be paid at time and one-half the applicable rate.
4) Hours worked on Sundays and Holidays shall be paid at double the straight time rate.
5) Work of a new construction nature may not be worked under these conditions.

SHIFT WORK
The following rates will apply on all contracting agency mandated multiple shifts of eight (8) hours for at least five (5) days duration which may have been worked. When two (2) shifts or three (3) shifts are worked:

1ST SHIFT	8:00 AM - 4:30 PM:	Regular wage rate
2ND SHIFT	4:30 PM - 1:00 AM:	Regular wage rate plus 15%
3RD SHIFT	12:30 AM - 9:00 AM:	Regular wage rate plus 25%

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 35.58 plus 3% of hourly wage paid*

*NOTE: The 3% is based on the hourly wage paid, straight time rate or premium time rate.

OVERTIME PAY
See (B, *E, Q) on OVERTIME PAGE

*NOTE: On Saturday the first 8 hours worked shall be paid at a rate of one and one-half times the applicable rate. All additional hours are payable at double the straight time rate.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6, 15, 26) on HOLIDAY PAGE

NOTE: If any of the above holidays fall on Saturday, Friday shall be observed as the holiday. If any of the above holidays fall on Sunday, Monday shall be observed as the holiday.

REGISTERED APPRENTICES

WAGES per hour: Hourly terms at the following wage.

1st period (0-1000 hrs)	$ 21.60
2nd period (1001-2000)	24.30
3rd period (2001-3500)	27.00
4th period (3501-5000)	32.40
5th period (5001-6500)	37.80
6th Period (6501-8000)	43.20

SUPPLEMENTAL BENEFITS per hour:

1st period	$ 15.50*
2nd period	15.50*
3rd period	31.58*
4th period	32.38*
5th period	33.18*
6th period	33.98*

*NOTE: Plus 3% of hourly wage paid, straight time rate or premium time rate.

6-43

Electrician 09/01/2026

JOB DESCRIPTION Electrician **DISTRICT** 6

ENTIRE COUNTIES

PARTIAL COUNTIES
Cayuga: Only the Township of Genoa.
Schuyler: Only the Townships of Cayuta, Catharine, and Hector.
Seneca: Only the Townships of Lodi and Covert.
Tioga: Only the Townships of Spencer and Candor.
Tompkins: Entire county except the Township of Groton.

WAGES

Per hour:	07/01/2026	06/01/2027 Additional
Electrician	$ 47.00	$ 4.50*

* To be allocated at a later date.

NOTE: Additional amounts, subject to overtime premiums, due for the following work (applicable to all employees):
-Additional $ 1.00 per hour for work from trusses, scaffolds, frames, spider baskets, ladders, etc. 40 feet or more from ground floor, or in underground mines or tunnels. Work done from personal lift equipment that complies with OSHA requirements are excluded.
-Additional $ 2.00 per hour when required to work under compressed air, on radio towers, on asbestos abatement projects which require the use of a respirator, work of a hazardous nature, work where gas masks are required or work requiring use of protective arc flash suits.

SHIFT WORK
The following rates will apply when shift work is mandated either in the job specification or by the contracting agency.

1ST SHIFT	8:00 AM to 4:30 PM	Regular wage rate
2ND SHIFT	4:30 PM to 1:00 AM	Regular wage rate plus 17.3%
3RD SHIFT	12:30 AM to 9:00 AM	Regular wage rate plus 31.4%

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 32.23 plus 3% of hourly wage paid*

*NOTE: The 3% is based on the hourly wage paid, straight time rate or premium time rate.

OVERTIME PAY
See (B, *E, Q) on OVERTIME PAGE
*NOTE: On Saturday the first 8 hours worked shall be paid at a rate of one and one-half times the applicable rate. All additional hours are payable at double the straight time rate.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: When a holiday falls on a Saturday, the day preceding shall be celebrated as such, and when falling on a Sunday, Monday will be celebrated as the holiday.

REGISTERED APPRENTICES
WAGES per hour: One year terms at the following percentage of Journeyworker's wage.

1st year	50%
2nd year	55%
3rd year	65%
4th year	75%
5th year	85%

SUPPLEMENTAL BENEFITS per hour:

1st year	$ 14.93*
2nd year	14.93*
3rd year	25.63*
4th year	27.27*
5th year	27.92*

*NOTE: Plus 3% of hourly wage paid, straight time rate or premium time rate.

6-241

Elevator Constructor 09/01/2026

JOB DESCRIPTION Elevator Constructor **DISTRICT** 6

ENTIRE COUNTIES
Broome, Cayuga, Chenango, Cortland, Franklin, Jefferson, Lewis, Onondaga, Oswego, St. Lawrence, Tioga, Tompkins

PARTIAL COUNTIES
Delaware: Only the towns of: Tompkins, Walton, Masonville, Sidney, Franklin and Deposit.
Madison: Only the towns of: Cazenovia, DeRuyter, Eaton, Fenner, Georgetown, Lebanon, Lenox, Nelson and Sullivan.
Oneida: Only the towns of: Camden, Florence and Vienna.

WAGES

Per hour:	07/01/2026	01/01/2027
Mechanic	$ 60.99	$ 63.706
Mechanic Helper	42.69	44.594

SUPPLEMENTAL BENEFITS

Per hour:		
Journeyworker	$ 38.985*	39.535*

*NOTE: Add 6% of regular hourly rate for all hours worked. Add 8% of regular hourly rate if more than 5 years of service.

OVERTIME PAY
See (D, O) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6, 15, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE
NOTE: When a holiday falls on a Saturday, it shall be observed on Friday. When a holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES
WAGES per hour: 1 year terms at the following percentage of the Elevator Constructor Mechanic wage.

0-6 months	6-12 months	2nd year	3rd year	4th year
50%	55%	65%	70%	80%

SUPPLEMENTAL BENEFITS per hour:

0-6 months: 6% of the regular hourly apprentice rate paid, no additional supplemental benefits.

All other terms: Same as Journeyworker

6-62.1

Glazier 09/01/2026

JOB DESCRIPTION Glazier **DISTRICT** 5

ENTIRE COUNTIES
Broome, Chemung, Chenango, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

WAGES

Per hour:	07/01/2026
Glazier	$ 33.00

SUPPLEMENTAL BENEFITS

Per hour:	
Journeyworker	$ 34.15

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
1000 hour terms

Appr. 1st term	$ 21.00
Appr. 2nd term	22.00
Appr. 3rd term	23.00
Appr. 4th term	24.00
Appr. 5th term	25.00
Appr. 6th term	26.00
Appr. 7th term	27.00
Appr. 8th term	28.00

Supplemental Benefits per hour:

Appr. 1st term	$ 13.27
Appr. 2nd term	13.27
Appr. 3rd term	19.27
Appr. 4th term	19.27
Appr. 5th term	20.27
Appr. 6th term	20.27
Appr. 7th term	21.27
Appr. 8th term	21.27

5-677z3

Insulator - Heat & Frost 09/01/2026

JOB DESCRIPTION Insulator - Heat & Frost **DISTRICT** 7

ENTIRE COUNTIES
Broome, Cayuga, Chemung, Chenango, Cortland, Herkimer, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, Otsego, Schuyler, Seneca, St. Lawrence, Tioga, Tompkins

WAGES

Per hour:	07/01/2026	05/01/2027 Additional	05/01/2028 Additional	05/01/2029 Additional
ON MECHANICAL SYSTEMS ONLY:				
Asbestos Worker	$ 45.75	$ 4.50*	$ 4.75*	$ 6.25*
Insulation Installer	45.75	4.50*	4.75*	6.25*
Firestopping Worker	45.75	4.50*	4.75*	6.25*

* To be allocated at a later date.

SHIFT WORK
The following rates will apply on all contracting agency-mandated shifts worked:

1st Shift	$ 45.75
2nd Shift	52.61
3rd Shift	54.90

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 28.59

OVERTIME PAY
See (*B1, **K, P) on OVERTIME PAGE
*NOTE: First 10 hours on Saturday.
**NOTE: Holidays that fall on Sunday are subject to double time.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (2*,4,6,28) on HOLIDAY PAGE
*Triple time for Labor Day if worked.

REGISTERED APPRENTICES
WAGES per hour: One (1) year terms at the following percentage of Journeyworker's wage.

1st	2nd	3rd	4th
60%	70%	80%	90%

SUPPLEMENTAL BENEFITS per hour:

$ 24.24	$ 24.24	$ 28.59	$ 28.59

7-30-Syracuse

Ironworker 09/01/2026

JOB DESCRIPTION Ironworker **DISTRICT** 6

ENTIRE COUNTIES
Broome, Cayuga, Cortland, Onondaga, Oswego, Seneca, Tioga, Tompkins

PARTIAL COUNTIES
Chenango: Only the townships of Afton, Bainbridge, Coventry, German, Greene, Guilford, Lincklaen, McDonough, Norwich, Otselic, Oxford, Pharsalia, Pitcher, Preston and Smithville.
Jefferson: Only the townships of Adams, Alexandria, Brownville, Cape Vincent, Clayton, Ellisburg, Henderson, Hounsfield, LeRay, Lorraine, Lyme, Orleans, Pamelia, Rodman, Rutland, Theresa, Watertown and Worth.
Madison: Only the townships of Cazenovia, DeRuyter, Fenner, Georgetown, Lenox, Lincoln, Nelson, Smithfield and Sullivan.
Schuyler: Only the townships of Cayuta, Catharine, Hector and Montour.
Wayne: Only the townships of Butler, Galen, Huron, Rose, Savannah and Wolcott.

WAGES
Structural, Reinforcing, Re-bar, Machinery Mover & Rigger, Ornamental & Curtain Wall, Window Wall, Pre-Glazed Metal Framed Windows Attached to Steel or Masonry Including Caulking, Fence Erector (Chain Link/Security), Sheeter/Bridge Rail, Pre-Cast Erector, Stone Derrickman, Pre-Engineered Building Erector, Welder

Per hour: 07/01/2026

Ironworker	$ 38.50

SHIFT WORK
Multiple shifts mandated by the project owner. All shifts will be eight (8) hours.

1st Shift	Regular wage rate	
2nd Shift	Regular wage rate plus 10% -	Starting times between 2 PM and 7 PM
3rd Shift	Regular wage rate plus 15% -	Starting times between 7 PM and 12 AM

NOTE: When a single irregular shift is worked, with start times based on second or third shifts, add 10% to the 1st shift wage rate posted above.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 33.30

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

NOTE: Any holiday which occurs on Saturday shall be observed on the preceding Friday. Any holiday which occurs on Sunday shall be observed the following Monday.

REGISTERED APPRENTICES
WAGES per hour: One year terms at the following rates.

1st	2nd	3rd	4th
$ 21.50	$ 23.50	$ 25.50	$ 27.50

SUPPLEMENTAL BENEFITS per hour:

1st year	$ 13.28
2nd year	21.82
3rd year	23.04
4th year	24.26

6-60

Laborer - Building 09/01/2026

JOB DESCRIPTION Laborer - Building **DISTRICT** 2

ENTIRE COUNTIES
Broome, Chemung, Cortland, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES
Chenango: Entire County except the Townships of Sherburne, Columbus and New Berlin.
Delaware: Only the Townships of Sidney, Masonville, Walton, Tompkins, Deposit, Hancock, and Colchester.

WAGES
Per hour:

GROUP #1: Basic Laborer - excavation, concrete vibrator, power-driven buggie, demolition (including acetylene torch work) that is customarily done by a laborer

GROUP #2: Air Tool Operators, Mason Tenders

GROUP #3: Blaster, Rock Drill (compressor driven)

GROUP #4: Asbestos, Hazardous, Toxic Waste, Lead and Mold Remediation

	07/01/2026
GROUP #1	$ 31.25
GROUP #2	32.25
GROUP #3	33.25
GROUP #4	33.25

IMPORTANT NOTES:
- Laborer tasks on Renewable Energy and Green Energy construction work shall be paid at the appropriate Heavy & Highway rates.
- Wage and supplement rates for the operation of forklift and skid steer may be found under the classification "Operating Engineer".

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 20.20

OVERTIME PAY
See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
When a holiday falls on Sunday, it shall be observed on the following Monday.

REGISTERED APPRENTICES
WAGES: 1000 hour terms at the following percentage of Journeyworker's wage.

1st	2nd	3rd	4th
70%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

1st term	$ 15.85
2nd term	17.10
3rd term	17.98
4th term	18.85

2-785b

Laborer - Heavy&Highway 09/01/2026

JOB DESCRIPTION Laborer - Heavy&Highway **DISTRICT** 2

ENTIRE COUNTIES
Broome, Chemung, Cortland, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES
Chenango: Entire County except the Townships of Sherburne, Columbus, and New Berlin.
Delaware: Only the Townships of Sidney, Masonville, Walton, Tompkins, Deposit, Hancock and Colchester.

WAGES
Per hour:

GROUP A: Drill Helper, Flagman, Outboard and Hand Boats.

GROUP B: Basic Rate, Bull Float (where used for strike off only), Chain Saw, Concrete Aggregate Bin, Concrete Bootmen, Gin Buggy, Hand or Machine Vibrator, Jack Hammer, Mason Tender, Mortar Mixer, Pavement Breaker, Handlers of Steel Mesh, Small Generators for Laborers Tools, Installation of Bridge Drainage Pipe, Pipe Layers, Vibrator Type Rollers, Tamper, Drill Doctor, Water Pump Operators (1-1/2" & Single Diaphragm), Nozzle (Asphalt, Gunite, Seeding, and Sand Blasting), Laborers on Chain Link Fence Erection, Rock Splitter and Power Unit, Pusher Type Concrete Saw and all other Gas, Electric, and Air Tool Operators, Wrecking Laborer.

GROUP C: Drilling equipment - only where a separate air compressor unit supplies power, Acetylene Torch Operators, Asphalt Raker, Powder Man, Tail or Screw Operator on Asphalt Paver.

GROUP D: Blasters, Form Setters (slab steel forms on highways, roads, streets & airport runways), Stone or Granite Curb Setters.

GROUP E: Hazardous Waste defined as when an employee performs hazardous waste removal, lead abatement and removal, asbestos abatement and removal work on State and/or Federally designated waste site and were relevant State and/or Federal regulations require employees to use or wear required forms of personal protection.

	07/01/2026	07/01/2027 Additional
GROUP A	$ 39.80	$ 4.20*
GROUP B	40.00	4.20*
GROUP C	40.20	4.20*
GROUP D	40.40	4.20*
GROUP E	45.00	4.20*

*To be allocated at a later date.

IMPORTANT NOTES:
- Laborer tasks on Renewable Energy and Green Energy construction work shall be paid at the appropriate Heavy & Highway rates.
- Wage and supplement rates for the operation of forklift and skid steer may be found under the classification "Operating Engineer".
- When an employee is required by the employer and/or by the material data safety sheets of a product, during its application, to wear a half or full-face replaceable cartridge respirator for more than (2) hours, then in such case said employee(s) will be paid the Group E rate for the shift.

SHIFT WORK
A single irregular work shift starting any time between 5:00 PM and 1:00 AM on governmental mandated night work shall be paid an additional $5.00 per hour.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 28.01

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
- If Holiday falls on Sunday, it will be celebrated on Monday. If the Holiday falls on Saturday, it will be celebrated on Saturday.
- An Employee must work the scheduled working day before and the scheduled working day after a holiday to receive holiday pay.

REGISTERED APPRENTICES
WAGES: 1000 hour terms at the following percentage of Journeyworker's GROUP B wage:

1st	2nd	3rd	4th
70%	80%	90%	95%

SUPPLEMENTAL BENEFITS per hour:
All terms $ 28.01

2-785h

Laborer - Tunnel 09/01/2026

JOB DESCRIPTION Laborer - Tunnel **DISTRICT** 2

ENTIRE COUNTIES
Broome, Chemung, Cortland, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES
Chenango: Entire County except the Townships of Sherburne, Columbus, and New Berlin.
Delaware: Only the Townships of Sidney, Masonville, Walton, Tompkins, Deposit, Hancock and Colchester.

WAGES
Per hour:

GROUP A: Change House Man

GROUP B: Miners and all Machine Men, Safety Miner, All Shaft work, Caisson work, Drilling, Blow Pipe, all Air Tools, Tugger, Scaling, Nipper, Guniting pot to nozzle, Bit Grinder, Signal Man (top and bottom), Concrete Man, Shield Driven Tunnels, mixed face and soft ground, liner plate tunnels in free air.

GROUP C: Blaster

GROUP D: Hazardous waste removal work on a State and/or Federally designated waste site where relevant State and/or Federal regulations require employees to use or wear required forms of personal protection.

	07/01/2026	07/01/2027 Additional
Group A	$ 42.98	$ 4.20*
Group B	43.18	4.20*
Group C	47.98	4.20*
Group D	47.98	4.20*

*To be allocated at a later date

IMPORTANT NOTES:
- When an employee is required by the employer and/or by the material data safety sheets of a product, during its application, to wear a half or full face replaceable cartridge respirator for more then (2) hours, then in such case said employee(s) will be paid the Group D rate for the shift.

SHIFT WORK
A single irregular work shift starting any time between 5:00 PM and 1:00 AM on governmental mandated night work shall be paid an additional $5.00 per hour.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker $ 28.01

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE
- If Holiday falls on Sunday, it will be celebrated on Monday. If the Holiday falls on Saturday, it will be celebrated on Friday.

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
If the holiday falls on Saturday, it will be celebrated on Friday. If the holiday falls on Sunday, it will be celebrated on Monday

REGISTERED APPRENTICES
WAGES: 1000 hour terms at the following percentage of Group B wage

1st	2nd	3rd	4th
70%	80%	90%	95%

SUPPLEMENTAL BENEFITS per hour:

All Terms	$ 28.01

2-785T

Lineman Electrician 09/01/2026

JOB DESCRIPTION Lineman Electrician **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES
A Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors, assembly of all electrical materials, conduit, pipe, or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

Crane Operators: Operation of any type of crane on line projects.
Crawler Backhoe: Operation of tracked excavator/crawler backhoe with 1/2 yard bucket or larger on line projects.
Digging Machine Operator: All other digging equipment and augering on line projects.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

NOTE: Includes Teledata Work within ten (10) feet of High Voltage Transmission Lines. Also includes digging of holes for poles, anchors, footer, and foundations for electrical equipment.

-----Below rates applicable on all overhead and underground distribution and maintenance work, and all overhead and underground transmission line work and the installation of fiber optic cable where no other construction trades are or have been involved. Includes access matting for line work.

Per hour:	07/01/2026	05/03/2027	05/01/2028
Group A:			
Lineman, Technician	$ 64.37	$ 66.84	$ 69.47
Crane, Crawler Backhoe	64.37	66.84	69.47
Welder, Cable Splicer	64.37	66.84	69.47
Group B:			
Digging Mach. Operator	$ 57.93	$ 60.16	$ 62.52
Group C:			
Tractor Trailer Driver	$ 54.71	$ 56.81	$ 59.05
Groundman, Truck Driver	51.50	53.47	55.58
Equipment Mechanic	51.50	53.47	55.58
Group D:			
Flagger	$ 35.40	$ 36.76	$ 38.21

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

-----Below rates applicable on all electrical sub-stations, switching structures, fiber optic cable and all other work not defined as "Utility outside electrical work." Includes access matting for line work.

Group A:			
Lineman, Technician	$ 64.37	$ 66.84	$ 69.47
Crane, Crawler Backhoe	64.37	66.84	69.47
Cable Splicer	70.81	73.52	76.42
Certified Welder, Pipe Type Cable	$ 67.59	$ 70.18	$ 72.94

Group B:			
Digging Mach. Operator	$ 57.93	$ 60.16	$ 62.52
Group C:			
Tractor Trailer Driver	$ 54.71	$ 56.81	$ 59.05
Groundman, Truck Driver	51.50	53.47	55.58
Equipment Mechanic	51.50	53.47	55.58
Group D:			
Flagger	$ 35.40	$ 36.76	$ 38.12

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

-----Below rates applicable on all railroad catenary installation and maintenance, third rail installation, bonding of rails and pipe type cable and installation of fiber optic cable. Includes access matting for line work.

Group A:			
Lineman, Tech, Welder	$ 65.81	$ 68.34	$ 71.03
Crane, Crawler Backhoe	65.81	68.34	71.03
Cable Splicer	72.39	75.17	78.13
Certified Welder, Pipe Type Cable	69.10	71.76	74.58
Group B:			
Digging Mach. Operator	$ 59.23	$ 61.51	$ 63.93
Group C:			
Tractor Trailer Driver	$ 55.94	$ 58.09	$ 60.38
Groundman, Truck Driver	52.65	54.67	56.82
Equipment Mechanic	52.65	54.67	56.82
Group D:			
Flagger	$ 36.20	$ 37.59	$ 39.07

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

-----Below rates applicable on all overhead and underground transmission line work & fiber optic cable where other construction trades are or have been involved. This applies to transmission line work only, not other construction. Includes access matting for line work.

Group A:			
Lineman, Tech, Welder	$ 67.10	$ 69.68	$ 72.43
Crane, Crawler Backhoe	67.10	69.68	72.43
Group B:			
Digging Mach. Operator	$ 60.39	$ 62.71	$ 65.19
Group C:			
Tractor Trailer Driver	$ 57.04	$ 59.23	$ 61.57
Groundman, Truck Driver	53.68	55.74	57.94
Equipment Mechanic	53.68	55.74	57.94
Group D:			
Flagger	$ 36.91	$ 38.32	$ 39.84

Additional 3% per hour above regular rate for entire crew when a helicopter is used. This will increase to 5% on May 03, 2027.

SHIFT WORK

The following rates will apply on all contracting agency mandated multiple shifts of at least five (5) days duration worked between the hours listed below:

1ST SHIFT	8:00 AM to 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM to 1:00 AM REGULAR RATE PLUS 17.3 %
3RD SHIFT	12:30 AM to 9:00 AM REGULAR RATE PLUS 31.4 %

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2026	05/03/2027	05/01/2028
Group A	$ 32.91*	$ 34.41*	$ 35.91*

Group B	$ 28.91*	$ 30.41*	$ 31.91*
Group C	$ 28.51*	$ 29.71*	$ 30.91*
Group D	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE. NOTE: Double time for all emergency work designated by the Contracting Agency.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid	See (5, 6, 8, 15, 25) on HOLIDAY PAGE
Overtime	See (5, 6, 8, 15, 25) on HOLIDAY PAGE

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES
WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyworker's Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

	07/01/2026	05/03/2027	05/01/2028
All terms:	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

6-1249a

Lineman Electrician - Teledata 09/01/2026

JOB DESCRIPTION Lineman Electrician - Teledata **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES
NOTE: Applies to all public work and covered private projects, including those receiving ConnectAll funding subject to LL 224-E,solicited prior to July 1, 2025. For all projects, excluding dial-up internet access service, solicited on or after July 1, 2025, please see BROADBAND

Per hour:	07/01/2026	01/04/2027	01/03/2028	01/01/2029
Cable Splicer	$ 42.03	$ 43.30	$ 44.59	$ 45.93
Installer, Repairman	39.89	41.09	42.32	43.59
Teledata Lineman	39.89	41.09	42.32	43.59
Tech., Equip. Operator	39.89	41.09	42.32	43.59
Groundman/Flagger	21.14	21.78	22.43	23.10

For outside work, stopping at first point of attachment (demarcation).

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work, please see LINEMAN.

SHIFT WORK
The following rates apply when the contracting agency mandates multiple shifts of at least five (5) days duration are worked. When two (2) or three (3) shifts are worked the following rates apply:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 6.18 plus 4%*	$ 6.43 plus 5%*	$ 6.43 plus 6%*	$ 6.68 plus 7%*

*NOTE: The percentage (%) listed above is based on the hourly wage paid, straight time rate or premium time rate.

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal, Lighting 09/01/2026

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

WAGES
Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors which includes, but is not limited to road loop wires; conduit and plastic or other type pipes that carry conductors, flex cables and connectors, and to oversee the encasement or burial of such conduits or pipes.

Crane Operators: Operation of any type of crane on Traffic Signal/Lighting projects.
Crawler Backhoe: Operation of tracked excavator/crawler backhoe with 1/2 yard bucket or larger on Traffic Signal/Lighting projects.
Digging Machine Operator: All other digging equipment and augering on Traffic Signal/Lighting projects.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

A flagger's duties shall consist of traffic control only.

Per hour:	07/01/2026	05/03/2027	05/01/2028
Group A:			
Lineman, Technician	$ 55.31	$ 57.40	$ 59.64
Crane, Crawler Backhoe	55.31	57.40	59.64
Certified Welder	58.08	60.27	62.62
Group B:			
Digging Machine	$ 49.78	$ 51.66	$ 53.68
Group C:			
Tractor Trailer Driver	$ 47.01	$ 48.79	$ 50.69
Groundman, Truck Driver	44.25	45.92	47.71
Equipment Mechanic	44.25	45.92	47.71
Group D:			
Flagger	$ 33.19	$ 34.44	$ 35.78

Above rates are applicable for installation, testing, operation, maintenance and repair on all Traffic Control (Signal) and Illumination (Lighting) projects, Traffic Monitoring Systems, and Road Weather Information Systems. Includes digging of holes for poles, anchors, footer foundations for electrical equipment; assembly of all electrical materials or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

SHIFT WORK
The following rates will apply on all contracting agency mandated multiple shifts of at least five (5) days duration worked between the hours listed below:

1ST SHIFT	8:00 AM TO 4:30 PM	REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM	REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM	REGULAR RATE PLUS 31.4%

SUPPLEMENTAL BENEFITS
Per hour:

	07/01/2026	05/03/2027	05/01/2028
Group A	$ 32.91*	$ 34.41*	$ 35.91*
Group B	$ 28.91*	$ 30.41*	$ 31.91*
Group C	$ 28.51*	$ 29.71*	$ 30.91*
Group D	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE.
NOTE: Double time for all emergency work designated by the Contracting Agency.
WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY
Paid: See (5, 6, 8, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25) on HOLIDAY PAGE
NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES
WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyworker's Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

	07/01/2026	05/03/2027	05/01/2028
All terms:	$ 28.41*	$ 29.54*	$ 30.67*

*NOTE: Plus 7% of the hourly wage paid. The 7% is based on the straight time rate or the premium time rate.

6-1249a-LT

Lineman Electrician - Tree Trimmer 09/01/2026

JOB DESCRIPTION Lineman Electrician - Tree Trimmer **DISTRICT** 6

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES
Applies to line clearance, tree work and right-of-way preparation on all new or existing energized overhead or underground electrical, telephone and CATV lines. This also includes stump removal near underground energized electrical lines including telephone and CATV lines.

Per hour:	07/01/2026	01/01/2027	01/03/2027
Tree Trimmer	$ 34.67	$ 34.67	$ 36.23
Equipment Operator	30.67	30.67	32.05
Equipment Mechanic	30.67	30.67	32.05
Truck Driver	24.93	24.93	26.05
Groundman	20.53	20.53	21.45
Flagger	16.20	16.20*	16.93

* This rate may be subject to a minimum wage increase 01/01/2027.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 11.23*	$ 11.48*	$ 11.48*

*NOTE: Plus 4.5% of the hourly wage paid. The 4.5% is based on the straight time rate or the premium time rate.

OVERTIME PAY
See (B, E, Q, X) on OVERTIME PAGE

WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE

NOTE: All paid holidays falling on a Saturday shall be observed on the preceding Friday. All paid holidays falling on a Sunday shall be observed on the following Monday.

6-1249TT

Mason - Building 09/01/2026

JOB DESCRIPTION Mason - Building **DISTRICT** 5

ENTIRE COUNTIES
Cortland, Tompkins

WAGES

Per hour:	07/01/2026
Building:	
Brick/Block layer, Cement Mason	$ 35.68
Plasterer/EFIS, Stone Mason, Tuck Pointer	

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 32.69

OVERTIME PAY
See (B,E,E2*,Q) on OVERTIME PAGE
*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages per hour:

One year terms at the following wage:

1st	2nd	3rd	4th
$ 22.62	$ 27.98	$ 29.29	$ 32.11

Supplemental Benefits per hour:

1st	2nd	3rd	4th
$ 25.95	$ 27.18	$ 30.27	$ 31.86

5-3B Ith - Z2

Mason - Heavy&Highway 09/01/2026

JOB DESCRIPTION Mason - Heavy&Highway **DISTRICT** 5

ENTIRE COUNTIES
Allegany, Broome, Chautauqua, Chemung, Chenango, Cortland, Delaware, Genesee, Livingston, Monroe, Ontario, Orleans, Otsego, Schuyler, Seneca, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Cattaraugus: Enitre county except in the Township of Perrysburg and the Village of Gowanda only the Bricklayer classification applies.
Erie: Only the Bricklayer classification applies.
Niagara: Only the Bricklayer classification applies.

WAGES

Per hour:	07/01/2026
Heavy & Highway:	
Cement Mason	$ 41.38
Bricklayer	41.38

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 27.03

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1500 hour terms at the following percentage of Journeyworker's wage:

1st	2nd	3rd	4th
50%	60%	70%	80%

Supplemental benefits per hour:

1st term	$ 15.78
2nd term	$ 25.07
3rd term	$ 25.56
4th term	$ 26.05

5-3h

Mason - Tile Finisher 09/01/2026

JOB DESCRIPTION Mason - Tile Finisher **DISTRICT** 5

ENTIRE COUNTIES

Broome, Chemung, Chenango, Cortland, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES

Allegany: Towns of Alfred, Almond, Andover and Burns in Allegany County

WAGES

Wages Per hour:	07/01/2026
Building:	
Marble, Slate, Terrazzo and Tile Finisher	$ 35.00

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	$ 24.47

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following wage:

1st	2nd	3rd
$ 21.00	$ 24.50	$ 28.00

Supplemental benefits per hour:

1st	2nd	3rd
$ 15.69	$ 16.39	$ 21.13

5-3TF - Z4

Mason - Tile Setter 09/01/2026

JOB DESCRIPTION Mason - Tile Setter **DISTRICT** 5

ENTIRE COUNTIES

Broome, Chemung, Chenango, Cortland, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

PARTIAL COUNTIES

Allegany: Towns of Alfred, Almond, Andover and Burns.

WAGES

Wages Per Hour:	07/01/2026
Building:	
Marble, Slate, Terrazzo and Tile Setter	$ 36.69

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	$ 28.56

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following wage:

1st	2nd	3rd	4th
$ 22.01	$ 25.68	$ 29.35	$ 33.02

Supplemental benefits per hour:

1st	2nd	3rd	4th
$ 16.49	$ 17.31	$ 26.90	$ 27.73

5-3TS - Z4

Millwright 09/01/2026

JOB DESCRIPTION Millwright **DISTRICT** 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES

THE FOLLOWING RATE APPLIES TO ANY GAS/STEAM TURBINE AND OR RELATED COMPONENT WORK, INCLUDING NEW INSTALLATIONS OR MAINTENANCE AND ANY/ALL WORK PERFORMED WITHIN THE PROPERTY LIMITS OF A NUCLEAR FACILITY.

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional
Millwright - Power Generation	$ 50.00	$ 3.00*	$ 3.00*

* To be allocated at a later date.

NOTE: ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):
- Certified Welders shall receive an additional $ 1.75 per hour provided they are directed to weld.
- If a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) is required, then that employee shall receive an additional $ 1.50 per hour.
- An employee performing the work of a machinist shall receive an additional $ 2.00 per hour. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional $ 1.00 per hour.

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyworker	$ 28.45*

*NOTE: Subject to OT premium

OVERTIME PAY

See (B, E, E2, Q, V) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

NOTE: Any holiday that falls on Sunday shall be observed the following Monday. Any holiday that falls on Saturday shall be observed the preceding Friday.

REGISTERED APPRENTICES

WAGES per hour: One year terms at the following percentage of Journeyworker's wage:

Appr. 1st year	65%*
Appr. 2nd year	75%*
Appr. 3rd year	80%*
Appr. 4th year	90%*

*NOTE: Additional premium for the following work listed below:

Certified Welder	$ 1.75
Hazardous Waste Work	1.50
Machinist	2.00
Underground (500' and below)	1.00

SUPPLEMENTAL BENEFITS per hour:

Appr. 1st year	$ 11.96
Appr. 2nd year	23.50
Appr. 3rd year	25.15
Appr. 4th year	26.80

6-1163Power

Millwright 09/01/2026

JOB DESCRIPTION Millwright **DISTRICT** 6

ENTIRE COUNTIES

Chemung, Cortland, Livingston, Monroe, Ontario, Orleans, Schuyler, Steuben, Tompkins, Wayne, Wyoming

WAGES

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional
Building	$ 40.39	$ 3.00*	$ 3.00*
Heavy & Highway	43.89		

* To be allocated at a later date.

NOTE: ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):
- Certified Welders shall receive an additional $ 1.75 per hour provided they are directed to weld.
- On Building projects, If a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) is required, then that employee shall receive an additional $ 1.50 per hour.
- H/H work performed on hazardous waste sites where employees are required to wear protective gear shall receive an additional $ 2.00 per hour over the Millwright H/H rate for all hours worked on the day protective gear was worn.
- An employee performing the work of a machinist shall receive an additional $ 2.00 per hour. For the purposes of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional $ 1.00 per hour.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	$ 27.79

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

NOTE: Any holiday that falls on Sunday shall be observed the following Monday. Any holiday that falls on Saturday shall be observed the preceding Friday.

REGISTERED APPRENTICES

WAGES per hour: One year terms at the following percentage of Journeyworker's wage:

Appr. 1st year	65%*
Appr. 2nd year	75%*
Appr. 3rd year	80%*
Appr. 4th year	90%*

*NOTE: Additional premium for the following work listed below:

Certified Welder	$ 1.75
Hazardous Waste (Bldg)	1.50
Hazardous Waste (H/H)	2.00
Machinist	2.00
Underground (500' and below)	1.00

SUPPLEMENTAL BENEFITS per hour:

Appr. 1st year	$ 11.96
Appr. 2nd year	23.04
Appr. 3rd year	24.62
Appr. 4th year	26.21

6-1163

Operating Engineer - Building 09/01/2026

JOB DESCRIPTION Operating Engineer - Building **DISTRICT** 6

ENTIRE COUNTIES
Cayuga, Cortland, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, Seneca, St. Lawrence, Tompkins

WAGES
NOTE:
---If a prime contract is let for site work only, meaning no buildings are involved in their site contract, the Heavy/Highway rates would be applicable. When a prime contract is let for site work and building excavation is part of that contract, the Building rates would be applicable for the Operators classification.
---In the event that equipment listed below is operated by robotic control, the classification covering the operation will be the same as if manually operated.
---If a second employee is required by the employer for operation of any covered machine, they shall be an Engineer Class C.

CLASS A1**: All Cranes (A1 Includes Boom Trucks over 5 tons, Cableway, Cherry Picker, Derrick, Dragline, Dredge, Overhead Crane, Pile Driver, Tower Crane***, Truck Crane, Whirlies).

CLASS A: Air Plako, Asphalt & Blacktop Roller, Automated Concrete Spreader (CMI or equivalent), Automated Fine Grade Machine (CMI), Backhoe, Barrel Shredder, Belt Placer, Blacktop Spreader (such as Barber-Greene & Blaw Knox), Blacktop Plant (automated), Blast or Rotary Drill (Truck or Cat mounted), Boom Trucks (5 ton and under), Burning Plant Operator, Caisson Auger, Central Mix Plant (automated), Concrete Pump, Crusher (Rock), De-watering Press, Diesel Power Unit, Dirt Filter Press with Operation Equipment, Dredge, Dual Drum Paver, Elevating Grader (self-propelled or towed), Elevator Hoist - Two Cage, Excavator - all purpose hydraulically operated, Forklift (Loed/Lull and other rough terrain type), Front End Loader (4 c.y. and over), Gradall, Grader (Power), Head Tower (Saurman or equal), Hoist (2 or 3 Drum), Hydroblaster (Laser Pump), Light Plants - Compressors and Generators, Locomotive, Maintenance Engineer, Maintenance Welder, Mine Hoist, Mucking Machine or Mole, Quarry Master or Equivalent, Refrigeration Equipment (for soil stabilization), Scraper, Sea Mule, Shovel, Side Boom, Slip Form Paver, Straddle Buggy (Ross Carrier, Lumber Carrier), Tractor Drawn Belt Type Loader (Euclid Loader), Trenching Machine (digging capacity of over 4ft. depth), Truck or Trailer Mounted Log Chipper (self-feeder), Tug Operator (Manned, rented equipment excluded), Tunnel Shovel, Vibro or Sonic Hammer Controls (when not mounted in proximity to Rig Operator), Work Boat Operator including LCM's.

CLASS B: "A" Frame Truck, Back Dumps, Blacktop Plant (non-automatic), Boring Machine, Bulldozer, Cage-Hoist, Central Mix Plant (non-automated), Compressor, Pump, Generator or Welding machine (when used in battery of not more than five (5)), Concrete Paver (single drum over 16'), Core boring machine, Drill Rigs - tractor mounted, Elevator - as material hoist, Farm Tractor (with or without accessories), Forklift (over 10 ton with or without attachments), Front End Loader (under 4 c.y.), Grout Pump, Gunite Machine, High Pressure Boiler (15 lbs. & over), Hoist (one drum), Hydraulic Breaking Hammer (Drop Hammer), Kolman Plant Loader (screening gravel), Maintenance Grease Man, Mixer for stabilized base - self-propelled (Seaman Mixer), Monorail Machine, Parapet Concrete or Pavement Grinder, Parts Man, Post Driver (truck or tractor mounted), Post Hole Digger (truck or tractor mounted), Power Sweeper (Wayne or similar), Pump-Crete or Squeeze-Crete, Road Widener (front end of Grader or self-propelled), Roller, Self-contained hydraulic bench drill, Shell Winder (motorized), Skid steer (Bobcat type loader), Snorkel (overhead arms), Snowblower control man, Tractor (with or without accessories), Trenching Machine (digging capacity of 4 ft. or less), Tugger Hoist, Vacuum Machine (self-propelled or mounted), Vibro Tamp, Well Drill / Well Point System (Submersible pumps when used in lieu of Well Point System), Winch (Motor driven), Winch Cat, Winch Truck.

CLASS C: Compressor (up to 500 cfm), Concrete Paver or Mixer (under 16'), Concrete Pavement Spreaders & Finishers (not automated), Conveyor (over 12 ft), Electric Submersible Pump (4" and over), Fine Grade Machine (not automated), Fireman, Forklift ("with or without" attachments, 10 ton and under), Form Tamper, Generator (2,500 watts and over), Hydraulic Pump, Mechanical Heaters (More than two (2) Mechanical Heaters or any Mechanical Heater or Heaters whose combined output exceeds 640,000 BTU per hour (manufacturer's rating) plus one self-contained heating unit - i.e. Sundog or Air Heat type - New Holland Hay Dryer type excluded), Mulching Machine, Oiler, Power Driven Welding Machine (300 amp and over, other than all electric. One Welding Machine under 300 amp will not require an engineer unless in a battery), Power Heaterman (hay dryer), Pumps (water and trash), Revinius Widener (road widener), Single Light Plant, Steam Cleaner or Jenny.

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional	07/01/2029 Additional
Building				
Class A1**	$ 55.71	$ 4.75*	$ 4.25*	$ 4.68*
Class A	51.21	3.75*	3.75*	4.18*
Class B	49.09	3.75*	3.75*	4.18*
Class C	44.87	3.75*	3.75*	4.18*

* To be allocated at a later date.

Additional $ 2.50 per hour if work requires Personal Protective Equipment for hazardous waste site activities with a level C or over rating.

(**) TONNAGE PREMIUMS:
All cranes up to 64 ton capacity - A1 rate
All cranes 65 ton to 110 ton capacity - A1 rate plus $ 1.50
All cranes 111 ton to 199 ton capacity - A1 rate plus $ 2.00
All cranes 200 ton to 399 ton capacity - A1 rate plus $ 3.00
All cranes 400 ton to 599 ton capacity - A1 rate plus $ 4.00
All cranes 600 ton to 799 ton capacity - A1 rate plus $ 5.00
All cranes 800 ton to 999 ton capacity - A1 rate plus $ 6.00
All cranes 1000 ton capacity and over - A1 rate plus $ 7.00

(***) Tower Cranes - A1 rate plus $ 2.50 (no tonnage premiums apply)

- Cranes in Luffer Configuration - A1 rate plus $ 5.00
- Cranes with external ballast (Tray or Wagon) - A1 rate plus $ 5.00
- NOTE: These premiums are in addition to the tonnage premiums if over 400 tons.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker $ 33.03

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: If the holiday falls on Sunday, it will be celebrated on Monday.

REGISTERED APPRENTICES
WAGES per hour: Hourly terms at the following percentage of Journeyworker's CLASS A wage:

1st: 60%
2nd: 65%
3rd: 70%
4th: 80%

Additional $ 2.50 per hour if work requires Personal Protective Equipment for hazardous waste site activities with a level C or over rating.

SUPPLEMENTAL BENEFITS per hour:

All terms: $ 32.95

6-158-545b.s

Operating Engineer - Heavy&Highway 09/01/2026

JOB DESCRIPTION Operating Engineer - Heavy&Highway **DISTRICT** 6

ENTIRE COUNTIES
Cayuga, Cortland, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, Seneca, St. Lawrence, Tompkins

WAGES

NOTE:
---In the event that equipment listed below is operated by robotic control, the classification covering the operation will be the same as if manually operated.
---If a second employee is required by the employer for operation of any covered machine, they shall be an Engineer Class C.

CLASS A1**: All Cranes that require a NYS Crane License (Boom Truck, Cableway, Cherry Picker, Derrick, Dragline, Overhead Crane (Gantry or Straddle Type), Pile Driver, Tower Cranes (including self-erecting)***, Truck Crane).

CLASS A: Asphalt Curb Machine (self-propelled, slipform); Asphalt Paver; Automated Concrete Spreader (CMI type); Automatic Fine Grader; Backhoe (except tractor mounted, rubber tired); Backhoe Excavator, Full Swing (CAT 212 or similar type); Back Filling Machine; Belt Placer (CMI type); Blacktop Plant (automated); Blacktop Roller; Bull Dozer being operated with active GPS; Caisson Auger; Central Mix Concrete Plant (automated); Concrete Curb Machine (self-propelled, slipform); Concrete Pump; Cranes - listed in A1 that do not require a NYS Crane License; Directional Boring/Drilling Machine; Dredge; Dual Drum Paver; Excavator (all purpose-hydraulic, Gradall or similar); Front End Loader (4 cu. yd. & over); Head Tower (Sauerman or equal); Hoist (two or three drum); Holland Loader; Jetting Plow; Maintenance Engineer; Mine Hoist; Mucking Machine or Mole; Pavement Breaker (SP Wirtgen; PB-4 and similar type); Profiler/Milling Machine (over 105 h.p.); Power Grader; Quad 9; Quarry Master (or equivalent); Rotating Telehandler; Scraper (including challenger type); Shovel; Side Boom; Slip Form Paver; Tractor Drawn Belt-Type Loader; Truck or Trailer Mounted Log Chipper (self-feeder); Tug Operator (manned rented equipment excluded); Tunnel Shovel.

CLASS B: Backhoe (tractor mounted, rubber tired); Bituminous Recycler Machine; Bituminous Spreader and Mixer; Blacktop Plant (non-automated); Blast or Rotary Drill (truck or tractor mounted); Boring Machine; Bridge Deck Finishing Machine; Brokk; Cage Hoist; Central Mix Plant (non-automated) and All Concrete Batching Plants; Concrete Paver (over 16'); Crawler Drill (self-contained); Crusher; Diesel Power Unit; Drill Rigs (truck or tractor mounted); Front End Loader (under 4 cu. yd.); Greaseman - Lubrication Engineer; HiPressure Boiler (15 lbs & over); Hoist (one drum); Hydro-Axe; Kolman Plant Loader & similar type loaders (if employer requires another man to clean the screen or to maintain the equipment, they shall be an Oiler); Locomotive; Material Handling Knuckle Boom; Mini Excavators (under 18,000 lbs.); Mixer (for stabilized base, self-propelled); Monorail Machine; Profiler/Milling Machine (105 h.p. and under); Plant Engineer; Prentice Loader; Pug Mill; Pump Crete; Ready Mix Concrete Plant; Refrigeration Equipment (for soil stabilization); Road Widener; Roller (all above subgrade, See Class A for Blacktop Roller); Sea Mule; Self-contained ride-on Rock Drill (excluding Air-Track type drill); Skidder; Tractor with Dozer and/or Pusher; Trencher; Tugger Hoist; Vacuum Machine (mounted or towed); Vermeer Saws (ride-on, any size or type); Welder; Winch and Winch Cat; Work Boat Operator including L.C.M.'s.
NOTE: Effective 07/01/27 Prentice Loader will move to CLASS A.

CLASS C: "A" Frame Winch Hoist (On Truck); Aggregate Plant; Articulated Heavy Hauler; Asphalt or Concrete Grooving Machine (ride-on); Ballast Regulator (ride-on); Bituminous Heater (self-propelled); Boat (powered); Boiler (used in conjunction with production); Cement & Bin Operator; Compressors****; Concrete Pavement Spreader and Finisher; Concrete Paver or Mixer (16' & under); Concrete Saw (self-propelled); Conveyor; Deck Hand; Directional Boring/Drilling Machine Locator; Drill (Core); Drill (Well); Dust Collectors****; Electric Pump When Used in Conjunction with Well Point System; Farm Tractor with accessories; Fine Grade Machine; Fireman; Forklift; Form Tamper; Generators****; Grout Pump; Gunite Machine; Hammers (hydraulic self-propelled); Heaters****; Hydra-Spiker (ride-on); Hydraulic Pump (jacking system); Hydro-Blaster (water); Light Plants****; Mulching Machine; Oiler; Parapet Concrete or Pavement Grinder; Post Hole Digger (excluding hand-held); Post Driver; Power Broom (towed); Power Heaterman; Power Sweeper; Pumps****; Revinius Widener; Roller (subgrade & fill); Scarifier (ride-on); Shell Winder; Skid Steer Loader (Bobcat or similar) including all attachments; Span Saw (ride-on); Steam Cleaner; Tamper (ride-on); Tie Extractor (ride-on); Tie Handlers (ride-on); Tie Inserters (ride-on); Tie Spacers (ride-on); Tire Repair; Track Liner (ride-on); Tractor; Tractor (with towed accessories); Vacuum Machine (self-propelled); Vibratory Compactor; Vibro Tamp; Welding Machines****; Well Point.

****CLASS C NOTE: Considered Hands-Off (unmanned). Includes only operation and maintenance of the equipment.

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional	07/01/2029 Additional
CLASS A1**	$ 62.11	$ 4.29*	$ 4.42*	$ 4.56*
CLASS A	58.36	3.54*	3.67*	3.81*
CLASS B	57.48	3.54*	3.67*	3.81*
CLASS C	54.20	3.54*	3.67*	3.81*

* To be allocated at a later date.

(**) TONNAGE PREMIUMS:
All cranes up to 64 ton capacity - A1 rate
All cranes 65 ton to 110 ton capacity - A1 rate plus $ 1.50
All cranes 111 ton to 199 ton capacity- A1 rate plus $ 2.00
All cranes 200 ton to 399 ton capacity - A1 rate plus $ 3.00
All cranes 400 ton to 599 ton capacity - A1 rate plus $ 4.00
All cranes 600 ton to 799 ton capacity - A1 rate plus $ 5.00
All cranes 800 ton to 999 ton capacity - A1 rate plus $ 6.00
All cranes 1000 ton capacity and over - A1 rate plus $ 7.00

(***) Tower Cranes - A1 rate plus $ 3.00 (no tonnage premiums apply)

- Cranes in Luffer Configuration - A1 rate plus $ 5.00
- Cranes with external ballast (Tray or Wagon) - A1 rate plus $ 5.00

Additional $ 2.50 per hour for hazardous waste removal work on a State and/or Federally designated waste site which requires employees to wear Level C or above forms of personal protection.

SHIFT WORK
SINGLE IRREGULAR WORK SHIFT: Additional $ 2.50 per hour for all employees who work a single irregular work shift starting from 5:00 PM to 1:00 AM that is mandated by the Contracting Agency.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 34.45

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (5, 6) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

NOTE: If a holiday falls on Sunday, it will be celebrated on Monday. If an employee works on this Monday, they shall be compensated at double time plus the holiday pay (triple time).

REGISTERED APPRENTICES
WAGES per hour: Hourly terms at the following percentage of Journeyworker's CLASS B wage.

1st term (0-1000 hrs):	60%
2nd term (1001-2000 hrs):	75%
3rd term (2001-3000 hrs):	80%
4th term (3001-4100 hrs):	90%

An additional $ 2.50 per hour is required when an apprentice performs hazardous waste removal work on a State and/or Federally designated waste site which requires employees to wear Level C or above forms of personal protection.

SUPPLEMENTAL BENEFITS per hour: Same as Journeyworker.

6-158-545h

Operating Engineer - Survey Crew 09/01/2026

JOB DESCRIPTION Operating Engineer - Survey Crew **DISTRICT** 12

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Dutchess: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.

WAGES
These rates apply to Building, Tunnel, and Heavy Highway.

Per hour:
SURVEY CLASSIFICATIONS:
Party Chief - One who directs a survey party and/or works independently.
Surveyor - One who operates the surveying instruments for measurements.
Survey Assistant - One who assists the Party Chief or Surveyor.

	07/01/2026	07/01/2027 Additional	07/01/2028 Additional
Party Chief	$ 56.64	$ 5.50*	$ 5.50*
Surveyor	52.74	$ 4.50*	$ 4.50*
Surveyor Assistant	36.00	$ 3.50*	$ 3.50*

Additional $3.00/hr. for Tunnel Work.
Additional $2.50/hr. for EPA or DEC certified toxic or hazardous waste work.

*To be allocated at a later date.

SUPPLEMENTAL BENEFITS
Per hour worked:

Party Chief	$ 32.45
Surveyor	$ 32.45
Survey Assistant	$ 20.60

OVERTIME PAY
See (B, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES: 1000 hour terms based on percentage of Surveyor wage:

07/01/2026

0-1000	1001-2000	2001-3000
60%	70%	80%

SUPPLEMENTAL BENEFIT per hour worked:
All Terms: $ 22.65

12-158-545 D.H.H.

Operating Engineer - Survey Crew - Consulting Engineer 09/01/2026

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer **DISTRICT** 12

ENTIRE COUNTIES
Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES
Dutchess: The northern portion of the county from the northern boundary line of the City of Poughkeepsie, north.

WAGES
These rates apply to feasibility and preliminary design surveying, line and grade surveying for inspection or supervision of construction when performed under a Consulting Engineer Agreement.

Per hour:
SURVEY CLASSIFICATIONS:
Party Chief - One who directs a survey party and/or works independently
Surveyor - One who operates the surveying instruments for measurements
Survey Assistant - One who assists the Party Chief or Surveyor.

	07/01/2026	07/01/2027 Additional	07/01/2028 Additional
Party Chief	$ 56.64	$ 5.50*	$ 5.50*
Surveyor	52.74	$ 4.50*	$ 4.50*
Survey Assistant	36.00	$ 3.50*	$ 3.50*

Additional $3.00/hr. for Tunnel Work.
Additional $2.50/hr. for EPA or DEC certified toxic or hazardous waste work.

*To be allocated at a later date.

SUPPLEMENTAL BENEFITS
Per hour worked:

Party Chief	$ 32.45
Surveyor	$ 32.45
Survey Assistant	$ 20.60

OVERTIME PAY
See (B, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
WAGES: 1000 hour terms based on percentage of Surveyor wage:

07/01/2026

0-1000	1001-2000	2001-3000
60%	70%	80%

SUPPLEMENTAL BENEFIT per hour worked:
All Terms: $22.65

12-158-545 DCE

Operating Engineer - Tunnel 09/01/2026

JOB DESCRIPTION Operating Engineer - Tunnel **DISTRICT** 7

ENTIRE COUNTIES
Albany, Allegany, Broome, Cayuga, Chemung, Chenango, Clinton, Columbia, Cortland, Essex, Franklin, Fulton, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Oneida, Onondaga, Ontario, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Warren, Washington, Wayne, Yates

PARTIAL COUNTIES
Dutchess: Northern part of Dutchess, to the northern boundary line of the City of Poughkeepsie, then due east to Route 115 to Bedell Road, then east along Bedell Road to VanWagner Road, then north along VanWagner Road to Bower Road, then east along Bower Road to Rte. 44 east to Rte. 343, then along Rte. 343 east to the northern boundary of the Town of Dover Plains and east along the northern boundary of the Town of Dover Plains, to the borderline of the State of Connecticut.
Genesee: Only that portion of the county that lies east of a line drawn down the center of Route 98 and the entirety of the City of Batavia.

WAGES
CLASS A: Automatic Concrete Spreader (CMI Type); Automatic Fine Grader; Backhoe (except tractor mounted, rubber tired); Belt Placer (CMI Type); Blacktop Plant (automated); Cableway; Caisson Auger; Central Mix Concrete Plant (automated); Concrete Curb Machine (self-propelled slipform); Concrete Pump (8" or over); Dredge; Dual Drum Paver; Excavator; Front End Loader (4 cu. yd & over); Gradall; Head Tower (Sauerman or Equal); Hoist (shaft); Hoist (two or three Drum); Log Chipper/Loader (self-feeder); Maintenance Engineer (shaft and tunnel); any Mechanical Shaft Drill; Mine Hoist; Mining Machine(Mole and similar types); Mucking Machine or Mole; Overhead Crane (Gantry or Straddle Type); Pile Driver; Power Grader; Remote Controlled Mole or Tunnel Machine; Scraper; Shovel; Side Boom; Slip Form Paver (If a second man is needed, they shall be an Oiler); Tripper/Maintenance Engineer (shaft & tunnel); Tractor Drawn Belt-Type Loader; Tug Operator (manned rented equipment excluded); Tunnel Shovel.

CLASS B: Automated Central Mix Concrete Plant; Backhoe (track mounted, rubber tired); Backhoe (topside); Bituminous Spreader and Mixer, Blacktop Plant (non-automated); Blast or Rotary Drill (truck or tractor mounted); Boring Machine; Cage Hoist; Central Mix Plant(non-automated); all Concrete Batching Plants; Compressors (4 or less exceeding 2,000 c.f.m. combined capacity); Concrete Pump; Crusher; Diesel Power Unit; Drill Rigs (tractor mounted); Front End Loader (under 4 cu. yd.); Grayco Epoxy Machine; Hoist (One Drum); Hoist (2 or 3 drum topside); Knuckle Boom material handler; Kolman Plant Loader & similar type Loaders (if employer requires another person to clean the screen or to maintain the equipment, they shall be an Oiler); L.C.M. Work Boat Operator; Locomotive; Maintenance Engineer (topside); Maintenance Grease Man; Mixer (for stabilized base-self-propelled); Monorail Machine; Plant Engineer; Personnel Hoist; Pump Crete; Ready Mix Concrete Plant; Refrigeration Equipment (for soil stabilization); Road Widener; Roller (all above sub-grade); Sea Mule; Shotcrete Machine; Shovel (topside); Tractor with Dozer and/or Pusher; Trencher; Tugger Hoist; Tunnel Locomotive; Vacuum Machine (mounted or towed); Welder; Winch; Winch Cat.

CLASS C: A Frame Truck; All Terrain Telescoping Material Handler; Ballast Regulator (ride-on); Compressors (4 not to exceed 2,000 c.f.m. combined capacity; or 3 or less with more than 1200 c.f.m. but not to exceed 2,000 c.f.m.); Compressors (any size, but subject to other provisions for compressors); Dust Collectors; Generators; Pumps; Welding Machines; Light Plants (4 or any type combination); Concrete Pavement Spreaders and Finishers; Conveyor; Drill (core); Drill (well); Electric Pump used in conjunction with Well Point System; Farm Tractor with Accessories; Fine Grade Machine; Fork Lift; Grout Pump (over 5 cu. ft.); Gunite Machine; Hammers (hydraulic-self-propelled); Hydra-Spiker (ride-on); Hydra-Blaster (water); Hydro-Blaster; Motorized Form Carrier; Post Hole Digger and Post Driver; Power Sweeper; Roller grade & fill); Scarifier (ride-on); Span-Saw (ride-on); Submersible Electric Pump (when used in lieu of well points); Tamper (ride-on); Tie-Extractor (ride-on), Tie Handler (ride-on), Tie Inserter (ride-on), Tie Spacer (ride-on); Track Liner (ride-on); Tractor with towed accessories; Vibratory Compactor; Vibro Tamp, Well Point.

CLASS D: Aggregate Plant; Cement & Bin Operator; Compressors (3 or less not to exceed 1,200 c.f.m. combined capacity); Compressors (any size, but subject to other provisions for compressors); Dust Collectors; Generators; Pumps; Welding Machines; Light Plants (3 or less or any type or combination); Concrete Saw (self-propelled); Form Tamper; Greaseman; Hydraulic Pump (jacking system); Junior Engineer; Light Plants; Mulching Machine; Oiler; Parapet Concrete or Pavement Grinder; Power Broom (towed); Power Heaterman (when used for production); Revinius Widener; Shell Winder; Steam Cleaner; Tractor.

Per hour:	07/01/2026	07/01/2027 Additional	07/01/2028 Additional	07/01/2029 Additional
CLASS A	$ 60.95	$ 3.54*	$ 3.67*	$ 3.81*
CLASS B	59.73	3.54*	3.67*	3.81*
CLASS C	56.94	3.54*	3.67*	3.81*
CLASS D	53.93	3.54*	3.67*	3.81*

* To be allocated at a later date.

Additional $5.00 per hour for Hazardous Waste Work on a state or federally designated hazardous waste site where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection.

CRANES:
Crane 1: All Tower cranes, including self-erecting.
Crane 2: All Lattice Boom Cranes and all other cranes with a manufacturer's rating of fifty (50) ton and over.
Crane 3: All hydraulic cranes and derricks with a manufacturer's rating of forty nine (49) ton and below, including boom trucks.

Crane 1	$ 64.95
Crane 2	63.95
Crane 3	62.95

SUPPLEMENTAL BENEFITS
Per hour:

$ 26.05
+ 10.85*

* This portion of the benefits subject to SAME PREMIUM as shown for overtime wages.

OVERTIME PAY
See (B, B2, E, Q, X) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: If a holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES
WAGES per hour: Hourly terms at the following percentage of Journeyworker's CLASS B wage.

1st term:	(0-1000 hrs)	60%
2nd term:	(1001-2000 hrs)	65%
3rd term:	(2001-3000 hrs)	70%
4th term:	(3001-4100 hrs)	75%

Additional $5.00 per hour for Hazardous Waste Work on a state or federally designated hazardous waste site where the Operating Engineer is in direct contact with hazardous material and when personal protective equipment is required for respiratory, skin and eye protection.

SUPPLEMENTAL BENEFITS per hour: Same as Journeyworker.

7-158-832TL.

Painter 09/01/2026

JOB DESCRIPTION Painter **DISTRICT** 2

ENTIRE COUNTIES
Cortland, Tompkins

WAGES
Per hour:

	07/01/2026
Painter	$ 29.12
Taper, Paperhangers, and Vinyl hangers	30.58

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):
- Additional $ 1.10 per hour for Brush and Roll Epoxy (Solvent Base Only)
- Additional $ 0.60 per hour for Swing Scaffold, Boatswain chair, Spray helper, Steam cleaning acid and high pressure water, Power grinders with respirator
- Additional $ 0.60 per hour for Structural steel (buildings) defined as new or old construction where ceilings, walls or the steel itself is to be painted from open trusses which require climbing or crawling without the support of solid scaffolding or scaffolding starting at the floor or ground level.
- Additional $ 1.00 per hour for Spray Painting
- Additional $ 1.50 per hour for Spray Epoxy (Solvent Based)
- Additional $ 0.90 per hour for Sandblasting

NOTE - SEE BRIDGE PAINTER RATES FOR BRIDGES & TANKS

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker $ 25.91

OVERTIME PAY
See (B, E2, F, R) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
A Holiday that falls on a Sunday will be celebrated on Monday, a holiday that falls on a Saturday will be celebrated on Friday.

REGISTERED APPRENTICES
WAGES:

Painter: 750 hour terms at the Painter Apprentice wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 18.00	$ 19.00	$ 20.00	$ 21.00	$ 22.00	$ 23.00	$ 24.00	$ 25.00

Taper: 750 hour terms at the following Journeyworker Taper Apprentice wage rate:

1st	2nd	3rd	4th	5th	6th
$ 20.00	$ 21.00	$ 22.00	$ 23.00	$ 24.00	$ 25.00

ADDITIONAL AMOUNTS FOR SPECIFIC TYPES OF JOBSITE CONDITIONS (amount subject to any overtime premiums):
- Additional $ 1.10 per hour for Brush and Roll Epoxy (Solvent Base Only)
- Additional $ 0.60 per hour for Swing Scaffold, Boatswain chair, Spray helper, Steam cleaning acid and high pressure water, Power grinders with respirator
- Additional $ 0.60 per hour for Structural steel (buildings) defined as new or old construction where ceilings, walls or the steel itself is to be painted from open trusses which require climbing or crawling without the support of solid scaffolding or scaffolding starting at the floor or ground level.
- Additional $ 1.00 per hour for Spray Painting
- Additional $ 1.00 per hour for Steeple Jack (Over 100 feet)
- Additional $ 1.50 per hour for Spray Epoxy (Solvent Based)
- Additional $ 0.90 per hour for Sandblasting

SUPPLEMENTAL BENEFITS per hour:
Painter/Decorator:

1st	2nd	3rd	4th	5th	6th	7th	8th
$ 6.00	$ 7.00	$ 8.00	$ 9.10	$ 11.00	$ 11.00	$ 13.00	$ 14.00

Taper/Drywall Finisher:

1st	2nd	3rd	4th	5th	6th
$ 6.00	$ 7.00	$ 8.00	$ 10.00	$ 13.00	$ 14.00

2-178 I

Painter 09/01/2026

JOB DESCRIPTION Painter **DISTRICT** 3

ENTIRE COUNTIES
Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Cortland, Delaware, Erie, Genesee, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

WAGES

Per hour:	07/01/2026
Bridge	$ 47.39
Tunnel	47.39
Tank*	45.39

For Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

*Tank rate applies to indoor and outdoor tanks, tank towers, standpipes, digesters, waste water treatment tanks, chlorinator tanks, etc. Covers all types of tanks including but not limited to steel tanks, concrete tanks, fiberglass tanks, etc.

SHIFT WORK
Note an additional $1.50 per hour is required when the contracting agency or project specification requires any shift to start prior to 6:00am or after 12:00 noon.

SUPPLEMENTAL BENEFITS
Per hour:
$ 32.81

OVERTIME PAY

Exterior work only See (B, E2, E4, F, R) on OVERTIME PAGE.
All other work See (B, F, R) on OVERTIME PAGE.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

750 hour terms at the following wage:

1st	2nd	3rd	4th	5th	6th
$ 24.00	$ 26.00	$ 28.00	$ 30.00	$ 34.00	$ 38.00

Supplemental benefits per hour:

1st	2nd	3rd	4th	5th	6th
$ 6.60	$ 6.95	$ 7.30	$ 7.65	$ 8.00	$ 8.35

3-4-Bridge, Tunnel, Tank

Painter - Metal Polisher 09/01/2026

JOB DESCRIPTION Painter - Metal Polisher **DISTRICT** 8

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

	07/01/2026
Metal Polisher	$ 41.33
Metal Polisher*	42.43
Metal Polisher**	45.33

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker:

All classifications	$ 13.99

OVERTIME PAY

See (B, E, P, T) on OVERTIME PAGE

HOLIDAY

Paid:	See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE
Overtime:	See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:
One (1) year term at the following wage rates:

	07/01/2026
1st year	$ 20.67
2nd year	22.73
3rd year	24.80
1st year*	$ 21.06
2nd year*	23.17
3rd year*	25.34
1st year**	$ 23.17
2nd year**	25.23
3rd year**	27.30

*Note: Applies on New Construction & complete renovation
** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:
Per hour:

1st year	$ 9.19
2nd year	9.19
3rd year	9.19

8-8A/28A-MP

Plumber 09/01/2026

JOB DESCRIPTION Plumber **DISTRICT** 6

ENTIRE COUNTIES
Chemung, Cortland, Onondaga, Schuyler, Tompkins

PARTIAL COUNTIES
Madison: Only the Townships of Sullivan, Cazenovia and DeRuyter.
Seneca: Only the Townships of Covert and Lodi.
Steuben: Only the Townships of Addison, Bath, Bradford, Campbell, Caton, Corning, Erwin, Hornby, Lindley, Pulteney, Rathbone, Thurston, Tuscarora, Urbana and Wayne.
Tioga: Only the Townships of Barton, Berkshire, Candor, Nichols, Richford, Spencer and Tioga.

WAGES
Per hour: 07/01/2026

Plumber, Steamfitter, Pipefitter, Welder, HVAC, Refrigeration.	$ 52.16

SHIFT WORK
SINGLE IRREGULAR WORK SHIFT: Additional 15% premium added to the wage rate above for a single irregular work shift starting between 4:30 PM and 7:00 AM.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 28.75*

*NOTE: $ 15.27 of the supplemental benefits are paid at the same premium as shown for overtime work performed at semi-conductor manufacturer and/or fabrication plants.

OVERTIME PAY
Time and one half for the 9th & 10th hours Monday through Friday and first 10 hours on Saturday. All other overtime hours are double time.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
NOTE: If a holiday falls on Saturday, the holiday will be observed on the preceding Friday. If a holiday falls on Sunday, it will be observed on the following Monday.

REGISTERED APPRENTICES
WAGES per hour: One year terms at the following percentage of the Journeyworker's wage:

1st	2nd	3rd	4th	5th
55%	60%	70%	75%	85%

SUPPLEMENTAL BENEFITS per hour*:

1st	$ 16.20
2nd	25.03
3rd	25.72
4th	26.34
5th	27.41

*NOTE: Below is the portion of supplemental benefits paid at overtime premiums for work performed at semi-conductor manufacturer and/or fabrication plants:

1st	n/a
2nd	$ 8.58
3rd	8.77
4th	9.14
5th	9.71

6-81-SF

Roofer 09/01/2026

JOB DESCRIPTION Roofer **DISTRICT** 2

ENTIRE COUNTIES
Broome, Chemung, Chenango, Delaware, Otsego, Schoharie, Schuyler, Steuben, Tioga, Tompkins

WAGES

Per hour:	07/01/2026	06/01/2027 Additional	06/01/2028 Additional
Roofer, Waterproofer	$ 31.79 + 1.06*	$ 3.50**	$ 4.00**

*This amount is paid for all hours worked, whether regular or premium hours.
**To be allocated at a later date.

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount not subject to overtime premiums):
- On days where more than one shift is worked on the job, the hours worked after 4:30 PM and before 6:00 AM will be paid an additional $1.90 per hour premium. This premium is not for use in emergency repair situations.
- Premium of $1.25 per hour will be paid for the application, rip-off, torching, or handling of pitch products. The premium will be paid for pitch that is showing, covered or buried on the roof.
- Premium of $1.25 per hour will be paid for asbestos abatement requiring a half face respirator.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 24.99

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES
Wages:
Indentured prior to 06/01/2026:

Hours per term	
0-667 Hrs.	$ 22.25 + 0.74*
668-1334 Hrs.	23.84 + 0.79*
1335-2001 Hrs.	25.43 + 0.85*
2002-2668 Hrs.	27.02 + 0.90*
2669-3335 Hrs.	28.61 + 0.95*
3336-4000 Hrs.	30.20 + 1.01*

Indentured on or after 06/01/2026:

Hours per term	
0-600 Hrs.	$ 25.43 + 0.85*
601-1200 Hrs.	26.23 + 0.87*
1201-1800 Hrs.	27.02 + 0.90*
1801-2400 Hrs.	27.82 + 0.93*
2401-3000 Hrs.	28.61 + 0.95*
3001-3600 Hrs.	29.41 + 0.98*
3601-4200 Hrs.	30.20 + 1.01*
4201-4800 Hrs.	31.00 + 1.03*

*This amount is paid for all hours worked, whether regular or premium hours.

NOTE ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount not subject to overtime premiums):
- On days where more than one shift is worked on the job, the hours worked after 4:30 PM and before 6:30 AM will be paid an additional $1.90 per hour premium. This premium is not for use in emergency repair situations.
- Premium of $1.25 per hour will be paid for the application, rip-off, torching, or handling of pitch products. The premium will be paid for pitch that is showing, covered or buried on the roof.
- Premium of $1.25 per hour will be paid for asbestos abatement requiring a half face respirator.

Supplemental Benefits:
Indentured prior to 06/01/2026:

Hours per term	
0-667 Hrs.	$ 20.93
668-1334 Hrs.	21.60
1335-2001 Hrs.	22.29

2002-2668 Hrs.	22.96
2669-3335 Hrs.	23.63
3336-4000 Hrs.	24.32

Indentured on or after 06/01/2026:

Hours per term	
0-600 Hrs.	$ 11.45
601-1200 Hrs.	11.45
1201-1800 Hrs.	19.50
1801-2400 Hrs.	23.30
2401-3000 Hrs.	23.63
3001-3600 Hrs.	23.97
3601-4200 Hrs.	24.32
4201-4800 Hrs.	24.65

2-203elmi

Sheetmetal Worker 09/01/2026

JOB DESCRIPTION Sheetmetal Worker **DISTRICT** 2

ENTIRE COUNTIES
Allegany, Broome, Chemung, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins

WAGES
Per hour:

	07/01/2026	05/01/2027 Additional
Sheetmetal Worker	$ 40.82 + 1.02*	$ 4.00**

NOTE: Ten cents ($0.10) per hour additional premium to be paid when working polyresin fiberglass.
*Amount is paid for every hour worked (amount not subject to overtime premium)
**To be allocated at a later date

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker: $ 25.33

OVERTIME PAY
See (*B1, Q) on OVERTIME PAGE
*On Saturday, time and one half of the hourly rate for the first ten (10) hours, then two (2) times the hourly wage rate for all hours after ten (10) hours worked.

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: Holidays are observed on the Holiday, not on the day that it is locally observed.

REGISTERED APPRENTICES
WAGES per hour:
Indentured after 05/01/2025 (1-year Terms):

	1st	2nd	3rd	4th	5th
07/01/2026	$ 24.49 +0.61*	$ 26.53 +0.66*	$ 28.57 +0.71*	$ 32.66 +0.82*	$ 34.70 +0.87*

Indentured prior to 05/01/2025 (Half Year Terms):

	1st	2nd	3rd	4th	5th	6th	7th	8th
07/01/2026	$ 24.49 +0.61*	$ 24.49 +0.61*	$ 26.53 +0.66*	$ 28.57 +0.71*	$ 30.62 +0.77*	$ 32.66 +0.82*	$ 34.70 +0.87*	$ 36.74 +0.92*

*Amount is paid for every hour worked (amount not subject to overtime premium)

SUPPLEMENTAL BENEFITS per hour:
Indentured after 05/01/2025:

	1st	2nd	3rd	4th	5th
07/01/2026	$ 2.28	$ 21.05	$ 21.13	$ 21.30	$ 25.08

Indentured prior to 05/01/2025:

	1st	2nd	3rd	4th	5th	6th	7th	8th
07/01/2026	$ 2.28	$ 2.28	$ 21.05	$ 21.13	$ 21.22	$ 21.30	$ 21.38	$ 21.46

2-112

Sprinkler Fitter 09/01/2026

JOB DESCRIPTION Sprinkler Fitter **DISTRICT** 1

ENTIRE COUNTIES
Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Washington, Wayne, Wyoming, Yates

WAGES
Per hour

	07/01/2026	01/01/2027	04/01/2027	01/01/2028
Sprinkler Fitter	$ 47.91	$ 47.91	$ 50.76	$ 50.76

SUPPLEMENTAL BENEFITS
Per hour

Journeyworker	$ 30.71	$ 31.71	$ 31.71	$ 32.71

OVERTIME PAY
See (B, E, Q) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE
Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES
One Half Year terms at the following wage per hour:

	07/01/2026	01/01/2027	04/01/2027	01/01/2028
1st Term	$ 24.50	$ 24.50	$ 25.73	$ 25.73
2nd Term	27.35	27.35	28.72	28.72
3rd Term	29.63	29.63	31.11	31.11
4th Term	31.91	31.91	33.50	33.50
5th Term	33.62	33.62	35.30	35.30
6th Term	36.47	36.47	38.29	38.29
7th Term	38.75	38.75	40.68	40.68
8th Term	41.03	41.03	43.08	43.08
9th Term	43.30	43.30	45.47	45.47
10th Term	45.58	45.58	47.86	47.86

Supplemental Benefits per hour:

1st & 2nd Term	$ 10.23	$ 11.23	$ 11.23	$ 12.23
3rd & 4th Term	22.79	23.79	23.79	24.79
All Other Terms	23.04	24.04	24.04	25.04

1-669

Teamster - Building 09/01/2026

JOB DESCRIPTION Teamster - Building **DISTRICT** 6

ENTIRE COUNTIES
Broome, Cayuga, Cortland, Delaware, Onondaga, Seneca, Tompkins, Yates

PARTIAL COUNTIES
Allegany: Only the Townships of Alfred, Almond, Burns.
Chenango: Only the Townships of Afton, Bainbridge, Coventry, Greene, Guilford, Oxford and Smithville.
Madison: Only the Townships of Cazenovia, DeRuyter, Fenner, Georgetown, Lenox, Nelson and Sullivan.
Oswego: All Townships except Boylston, Redfield and Sandy Creek.
Otsego: Only the Townships of Butternuts, Laurens, Maryland, Millford, Morris, Oneonta, Otego, Unadilla, and Worchester.
Steuben: Only the Townships of Canisteo, Cohoctan, Dansville, Fremont, Greenwood, Hornell, Hartsville, Jasper, Prattsburg, Troupsburg, and West Union.
Tioga: Only the Townships of Berkshire, Candor, Newark Valley, Nichols, Owego, Richford, and Tioga. All territory east of Nichols/Smithboro to Broome County, within the State of New York.

WAGES
GROUP A: Straight Trucks.
GROUP B: Tractor Trailer, Farm Tractor, Fuel Truck.
GROUP C: Euclid.
GROUP D: On site Mechanic.

Per hour:	07/01/2026	07/01/2027	07/01/2028
Building: (under $ 5 million*)			
GROUP A, B, C, D	$ 38.65	$ 42.31	$ 47.91
Building: (over $ 5 million*)			
GROUP A, B	$ 39.70	$ 43.36	$ 48.96
GROUP C	40.05	43.71	49.31
GROUP D	39.85	43.51	49.11

* Total project cost including General Construction, Plumbing, HVAC and Electrical

NOTE: All work performed at nuclear power plants, and fuel trucks that require a hazardous materials license, shall receive a $ 5.00 per hour premium above the applicable wage rate.

SUPPLEMENTAL BENEFITS
Per hour:

(under $ 5 million*)	$ 33.16	$ 35.51	$35.92
(over $ 5 million*)	33.96	36.31	36.73

* Total project cost including General Construction, Plumbing, HVAC and Electrical

OVERTIME PAY
(D, O) on OVERTIME PAGE

HOLIDAY
Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

6-317

Teamster - Heavy&Highway 09/01/2026

JOB DESCRIPTION Teamster - Heavy&Highway **DISTRICT** 6

ENTIRE COUNTIES
Cayuga, Cortland, Seneca, Tompkins, Yates

PARTIAL COUNTIES
Allegany: Only the Townships of Almond, Alfred, Burns.
Steuben: Only the Townships of Canisteo, Cohocton, Dansville, Freemont, Greenwood, Hartsville, Hornell, Jasper, Prattsburg, Troupsburg, and West Union.

WAGES
GROUP 1: Warehousemen*, Yardmen*, Truck Helpers, Pickups, Panel Trucks, Flatboy Material Trucks (straight jobs), Single Axle Dump Trucks, Dumpsters, Material Checkers & Receivers*, Greasers, Truck Tiremen, Mechanic Helpers and Parts Chasers, Tandems & Batch Trucks, Mechanics, Semi-Trailers, Low-boy Trucks, Asphalt Distributor Trucks and Agitator, Mixer Trucks and Dumpcrete type vehicles, Truck Mechanic, Fuel Trucks.

*NOTE: Applies when a temporary warehouse structure is built/utilized specifically for a public work project.

GROUP 2: Specialized Earth Moving Equipment-Euclid type, or similar off-highway equipment, where not self-loading, Straddle (Ross) Carrier, and self-contained concrete mobile truck, Off-highway Tandem Back-Dump, Twin Engine Equipment and Double-Hitched Equipment where not self-loading.

GROUP 3: Fuel trucks that require a HazMat license endorsement.

Per hour:	07/01/2026	07/01/2027
GROUP 1	$ 40.62	$ 44.28
GROUP 2	40.82	44.48
GROUP 3	45.62	49.28

SHIFT WORK
A single irregular work shift can start any time between 5:00 PM and 1:00 AM. All employees who work a single irregular shift on governmental mandated night work shall be paid an additional $ 5.00 per hour.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker	$ 29.94	$ 30.78

OVERTIME PAY
See (*B, B3, J, X) on OVERTIME PAGE
*Time and one half also applicable after the 5th day worked.

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

6-317(Syr)

Welder 09/01/2026

JOB DESCRIPTION Welder **DISTRICT** 1

ENTIRE COUNTIES
Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES
Per hour 07/01/2026

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

(AA)	Time and one half of the hourly rate after 7 and one half hours per day
(A)	Time and one half of the hourly rate after 7 hours per day
(B)	Time and one half of the hourly rate after 8 hours per day
(B1)	Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday. Double the hourly rate for all additional hours
(B2)	Time and one half of the hourly rate after 40 hours per week
(B3)	Time and one half of the hourly rate after 40 straight hours per week
(C)	Double the hourly rate after 7 hours per day
(C1)	Double the hourly rate after 7 and one half hours per day
(D)	Double the hourly rate after 8 hours per day
(D1)	Double the hourly rate after 9 hours per day
(E)	Time and one half of the hourly rate on Saturday
(E1)	Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
(E2)	Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E3)	Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
(E4)	Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
(E5)	Double time after 8 hours on Saturdays
(F)	Time and one half of the hourly rate on Saturday and Sunday
(G)	Time and one half of the hourly rate on Saturday and Holidays
(H)	Time and one half of the hourly rate on Saturday, Sunday, and Holidays
(I)	Time and one half of the hourly rate on Sunday
(J)	Time and one half of the hourly rate on Sunday and Holidays
(K)	Time and one half of the hourly rate on Holidays
(L)	Double the hourly rate on Saturday
(M)	Double the hourly rate on Saturday and Sunday
(N)	Double the hourly rate on Saturday and Holidays
(O)	Double the hourly rate on Saturday, Sunday, and Holidays
(P)	Double the hourly rate on Sunday
(Q)	Double the hourly rate on Sunday and Holidays
(R)	Double the hourly rate on Holidays

(S)	Two and one half times the hourly rate for Holidays
(S1)	Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.
(T)	Triple the hourly rate for Holidays
(U)	Four times the hourly rate for Holidays
(V)	Including benefits at SAME PREMIUM as shown for overtime
(W)	Time and one half for benefits on all overtime hours.
(X)	Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

(1)	None
(2)	Labor Day
(3)	Memorial Day and Labor Day
(4)	Memorial Day and July 4th
(5)	Memorial Day, July 4th, and Labor Day
(6)	New Year's, Thanksgiving, and Christmas
(7)	Lincoln's Birthday, Washington's Birthday, and Veterans Day
(8)	Good Friday
(9)	Lincoln's Birthday
(10)	Washington's Birthday
(11)	Columbus Day
(12)	Election Day
(13)	Presidential Election Day
(14)	1/2 Day on Presidential Election Day
(15)	Veterans Day
(16)	Day after Thanksgiving
(17)	July 4th
(18)	1/2 Day before Christmas
(19)	1/2 Day before New Years
(20)	Thanksgiving
(21)	New Year's Day
(22)	Christmas
(23)	Day before Christmas
(24)	Day before New Year's
(25)	Presidents' Day
(26)	Martin Luther King, Jr. Day
(27)	Memorial Day
(28)	Easter Sunday

(29) Juneteenth

NEW YORK STATE OFFICE OF PARKS, RECREATION AND HISTORIC PRESERVATION

TECHNICAL SPECIFICATIONS

Division 01 General Requirements
01 21 00 Allowances

END TABLE OF CONTENTS

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Contingency allowances.

C. Related Requirements:
1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Field Orders.

1.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Field Order.

1.4 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Field Orders that indicate amounts to be charged to the allowance.

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. Field Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by leaving in the balance to finish column on the Fin 112A payment application form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Contingency Allowance: Include a contingency allowance for use according to Owner's written instructions for each trade as follows:

1. D006612 GCW: $52,000.00, Fifty-Two Thousand Dollars and Zero Cents.

2. D006613 ECW: $9,150.00, Nine Thousand One Hundred Fifty Dollars and Zero Cents.

3. D006614 MCW: $4,650.00, Four Thousand Six Hundred Fifty Dollars and Zero Cents.

4: D006615 PCW: $15,950.00, Fifteen Thousand Nine Hundred Fifty Dollars and Zero Cents.

END OF SECTION 01 21 00

PROJECT MANUAL

For

Restroom #3

Robert H. Treman State Park

Ithaca, NY

GENERAL CONTRACT WORK (GCW) – D006612

ELECTRICAL CONTRACT WORK (ECW) – D006613

MECHANICAL CONTRACT WORK (HCW) – D006614

PLUMBING CONTRACT WORK (PCW) – D006615

New York State Office of Parks,

Recreation and Historic Preservation

Finger Lakes Region

2221 Taughannock Park Rd.

Trumansburg, NY 14886

Date: September 11, 2026

Construction Document Submission
Final Stamped

beardsley
architects + engineers

Beardsley Project #26007
115 Solar Street, Suite 102
Syracuse, New York 13204
Telephone: (315) 472-6980
Fax: (315) 472-3523

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SECTION 00 03 00

INFORMATION AVAILABLE TO BIDDERS

PART 1 - GENERAL

1.1 EXISTING REPORTS AND SURVEYS

A. Prior to bidding, Bidders may at their expense make their own investigations to satisfy themselves as to site conditions, but such investigations will be performed only under time schedules and arrangements approved in advance by the Director.

B. Information described below is exclusively for use on this specific Project.

1.2 TOPOGRAPHIC SURVEY

A. A topographic survey with respect to the project site was provided to the NYSOPRHP by Ravi Engineering and Land Surveying, P.C., dated December 23, 2025. This survey is available for viewing at the office of the Director.

B. This survey identifies grade elevations prepared primarily for the use of the Director, Architect/Engineer, and Landscape Architect in establishing new grades, identifying natural watersheds, and establishing site improvements shown on the Contract Documents. The Contractor is responsible for field verification of all survey information provided.

1.3 GEOTECHNICAL INVESTIGATION

A. Building Site Work

1. A geotechnical evaluation of the building site subsurface soil conditions including advancement of soil borings was completed for the NYSOPRHP and Beardsley Architects + Engineers by Ravi Engineering and Land Surveying, P.C. Refer to the Geotechnical Engineering Investigation Report dated December 31, 2025, at the end of this Section.

B. This Report is not part of the Contract Documents. This Report is available for Bidder's information but are not a warrant of site conditions.

END OF INFORMATION AVAILABLE TO BIDDERS

GEOTECHNICAL INVESTIGATION REPORT

(RAVI ENGINEERING & LAND SURVEYING, P.C.)

(For Bidders Information Not Warrant of Site Conditions)

RAVI ENGINEERING

December 23, 2023

Beardsley Architects + Engineers
115 Solar Street, Suite 102
Syracuse, New York 13204

Attention: Tom Ascienzo

Subject: Geotechnical Engineering Investigation
Proposed Restroom #3
Robert H. Treman State Park
Tompkins County, New York

Dear Mr. Ascienzo:

Ravi Engineering & Land Surveying, P.C. is pleased to submit the Geotechnical Engineering Investigation Report for the above referenced project. If you require additional information, please contact the undersigned at (585) 697-2821. Thank you.

Respectfully submitted,

RAVI ENGINEERING & LAND SURVEYING, P.C.

James D. MacKecknie
Project Manager

Attachment: Geotechnical Engineering Report – December 2025

RAVI ENGINEERING

REPORT

GEOTECHNICAL ENGINEERING INVESTIGATION

PROPOSED RESTROOM #3

ROBERT H. TREMAN STATE PARK

TOMPKINS COUNTY, NEW YORK

For

Beardsley Architects + Engineers

December 2025

2110 S. Clinton Avenue Rochester, NY 14618 ● Telephone: 585-223-3660 ● Email: info@ravieng.com

RAVI ENGINEERING

December 23, 2025

Beardsley Architects + Engineers
115 Solar Street, Suite 102
Syracuse, New York 13204

Attention: Tom Ascienzo

Subject: Geotechnical Engineering Investigation
Proposed Restroom #3
Robert H. Treman State Park
Tompkins County, New York

Readers:

This report presents the results of a geotechnical engineering investigation for the project identified above. Information regarding the proposed construction was provided to us by Beardsley.

UNDERSTANDING OF PROPOSED CONSTRUCTION

We understand that the restroom structure will occupy an area of roughly 1,000 square feet or less, that it will have one story, and that it will have no basement.

Areas of new pavement, in the vicinity of the restroom structure, are also planned.

SUBSURFACE EXPLORATIONS

Two test borings, identified as B-1 and B-2, were performed. The approximate as-drilled locations of the two borings are shown on the plan in attached Appendix A.

It was necessary to adjust the locations of the borings, because of surface access and existing subsurface utilities.

The borings were performed by Nothnagle Drilling, using a rotary drilling rig, on 12/8/25. Borings B-1 and B-2 were advanced to respective depths of 12 feet and 30 feet below the ground surface at the time of drilling.

The logs of the borings, as prepared by Nothnagle Drilling, are presented in attached Appendix B.

Groundwater was not observed at the location of B-1. Groundwater was observed at the location of B-2, at a depth as shallow as approximately 15 feet below the ground surface. It should be noted that short-term observations may not be representative of actual groundwater levels, and that groundwater levels will vary with factors including location, time, precipitation, season, and site activities.

DESIGN AND CONSTRUCTION

General

All design and construction should meet or exceed the requirements of all applicable codes.

With regard to the Building Code of New York State, a seismic Site Class of "D" should be applied to this project. This corresponds to a "Stiff soil profile."

Footings

All of the following requirements should be satisfied:

- No topsoil, organic matter, existing fill, existing utilities, or other unsuitable material should be left in place below a footing. At each of the two boring locations, the depth of unsuitable material was less than 1 foot below the ground surface. It should be noted that greater depths of unsuitable material may be present at other locations.
- Footings should bear on suitable natural soil, or on compacted granular fill.
- Any granular fill below a footing should be placed directly on suitable natural soil. The granular fill should extend laterally beyond each edge of the footing, a distance at least as great as the vertical thickness of granular fill below the footing.
- Subgrades should be prepared, and granular fill should be placed and compacted, as described elsewhere in this report.
- Continuous wall footings should be designed for a bearing pressure of 1,500 pounds per square foot or less, and should in no case be less than 24 inches wide.
- Any individual column footings should be designed for a bearing pressure of 1,500 pounds per square foot or less, and should in no case be less than 36 inches wide.
- Footings should be seated at least 4 feet below the lowest adjacent final surface.
- The imaginary slope between the bottom edges of any two footings should be no steeper than 1 vertical on 2 horizontal.
- Any stepped wall footings should be stepped in vertical increments of 12 inches or less, and horizontal increments of 24 inches or more.

Floor Slabs on Grade

No topsoil, organic matter, existing utilities, or other unsuitable material should be left in place below a floor slab on grade.

At least 12 inches of compacted granular fill should be placed beneath all floor slabs. Drained, unsaturated conditions should be maintained within the granular fill. Compacted common fill may be placed as required below the granular fill. Subgrades should be prepared, and fill should be placed and compacted, as described elsewhere in this report.

Floor slabs should be designed and constructed in accordance with ACI recommendations. It is also recommended that the design be based on a subgrade modulus (K) not exceeding 75 pounds per cubic inch.

Pavement

A practical pavement design is based on factors including subgrade quality, frost action, traffic loads, traffic frequency, design life, and the relative importance of initial costs versus future maintenance.

At this site, the subgrade quality for flexible pavement should be represented using a California Bearing Ratio (CBR) not exceeding 5.

For standard duty such as auto parking areas, the recommended minimum flexible pavement section consists of a 1-inch asphaltic top course, a 2-inch asphaltic binder course, and a 12-inch subbase course of compacted granular fill.

For areas subjected to more frequent and/or heavier vehicles, the minimum combined thickness of asphaltic top and binder courses should be increased to 5 inches. The minimum thickness of the granular subbase should be increased to 16 inches.

The subgrade quality for rigid pavement should be represented using a subgrade modulus (K) not exceeding 75 pounds per cubic inch. The rigid section should consist of reinforced concrete, and should be at least 6 inches thick. At least 12 inches of compacted granular fill should be placed below the slab.

For all pavement sections, compacted common fill may be placed as required below the granular fill.

Subgrade requirements would be the same as those for floor slabs on grade. Subgrades should be prepared, and fill should be placed and compacted, as described elsewhere in this report.

Drained, unsaturated conditions should be maintained within all pavement sections. Surface water should be conducted away from paved areas and structures.

The project designers may wish to consider pavement sections that are more or less conservative than those presented. This could depend on the traffic and cost factors described above, as well as the performance of existing and previous pavement sections within the park.

Excavation and Construction Dewatering

Excavation should be performed in accordance with all applicable local, state, and federal requirements. The sides of all excavations should be sloped or supported as required by safety regulations. Existing structures, utilities, and other property should be protected.

With regard to the current OSHA regulations, Type C soil should be assumed. This would apply to adequately dewatered soil.

To minimize disturbance, excavation should be performed with increasing care as subgrade levels are approached.

All work should be performed in the dry. In addition, the dewatering should be sufficient to permit suitable preparation of the subgrade and compaction of any subsequent fill materials.

The contractor should be prepared to dewater as necessary, and should choose and employ an appropriate type of dewatering system. Any dewatering system should be operated in such a way that disturbance or removal of the subgrade soil does not occur.

Subgrade Preparation

It is cautioned that the soils at this site contain fine-grained material, and that they will be sensitive to disturbance. Subgrades should be kept free of water, subjected to a minimum amount of construction traffic, exposed no longer than necessary, and not permitted to freeze.

Subgrades should be carefully prepared and thoroughly examined by qualified personnel, tamped using vibratory equipment (to the greatest extent practical without loosening or softening the subgrade soils), and proof rolled (where space permits) using a fully loaded ten-wheel dump truck or full-size roller.

No new fill or foundation concrete should be placed over material that is loose, soft, wet, frozen, organic, or otherwise unsuitable with respect to the design recommendations.

Fill and Backfill

Granular fill should consist of a durable sand and gravel or crusher-run stone, free of any organic matter. The plasticity index should be less than 5. Granular fill should have 100 percent finer than 3 inches, 20 to 60 percent finer than the Number 4 sieve, and no more than 10 percent finer than the Number 200 sieve.

Granular fill could also be specified as meeting the NYSDOT requirements for Subbase Course Type 1, 2, or 4.

Common fill should consist of durable soil material, free of any organic matter. The plasticity index should be less than 15. Common fill should have 100 percent finer than 6 inches, at least 90 percent finer than 3 inches, and at least 20 percent finer than the Number 4 sieve.

Some of the inorganic on-site soil will satisfy the material requirements for common fill. Little or none of the on-site soil, however, will satisfy the material requirements for granular fill. It should also be noted that granular fill meets all of the requirements of common fill, and that granular fill can generally be placed and compacted with less difficulty.

Fill and backfill should be compacted, in lifts of 9 inches or less, to at least 95 percent of the maximum dry density determined by ASTM D 1557.

The in-place density and water content of compacted fill should be determined by ASTM D 6938. For any compacted fill below wall footings, at least one test should be performed per 50 lineal feet of wall, per lift. For any compacted fill below column footings, at least one test should be performed per footing, per lift. For other areas such as floor slabs and pavements, at least one test should be performed per 2,500 square feet, per lift.

CLOSING COMMENTS AND RECOMMENDATIONS

Professional services for this investigation were performed in accordance with generally accepted geotechnical engineering practices, exclusively for the subject project. No warranty, expressed or implied, is made.

It should be noted that subsurface conditions are inferred from the logs of subsurface explorations; that each subsurface exploration is performed at a specific location and time; that conditions between, beyond, and below explorations are likely to vary; that conditions are often described on the basis of visual examinations of recovered samples; that visual descriptions may not always agree well with descriptions made on the basis of laboratory tests; that the distinction between fill and naturally-deposited soil can not always be readily determined on the basis of recovered samples; and that conditions can be changed by excavation and/or filling, performed after the exploration. If subsurface conditions are subsequently revealed that appear to be significantly different or less favorable than those described, we should be given the opportunity to revise the statements in this report.

Designers and contractors are advised that this report was prepared primarily for design purposes, and that it may not contain sufficient information for cost estimating or bidding. Contractors should visit the site, review this report and the related exploration logs, and evaluate potential construction difficulties on the basis of their own knowledge and experience.

It is recommended that qualified personnel be retained to review the geotechnical portions of the contract drawings and specifications, and to provide monitoring services during construction.

If you have questions or comments regarding this report, please contact the undersigned.

Yours truly,

RAVI ENGINEERING & LAND SURVEYING, P.C.

Nagappa Ravindra, P.E.
President

Ray M. Teeter, P.E.
Geotechnical Engineer

Attachments: Appendix A – Test Boring Location Plan

Appendix B – Logs of Test Borings B-1 and B-2, by Nothnagle Drilling

Appendix A

Test Boring Location Plan

RAVI ENGINEERING
2110 SOUTH CLINTON AVENUE, SUITE 1
ROCHESTER, NEW YORK 14618
TL: (585) 223-3660 FX (585) 697-1794

Proposed Restroom #3
Robert H. Treman State Park
Tompkins County, New York

PROJECT NO.	DATE:
20-23-189-D	DEC. 2025

TEST BORING LOCATION PLAN

SCALE:	DRAWING NO:
N.T.S	1

Appendix B

Logs of Test Borings B-1 and B-2, by Nothnagle Drilling

NOTHNAGLE *DRILLING*, INC.
1821 Scottsville-Mumford Road
Scottsville, New York 14546

Phone (585) 538-2328
Fax (585) 538-2357

Test Boring No B-2
Page 1 of 1
ND Job # 259140

Project :Proposed Restroom #3, Robert H. Treman State Park, Tompkins County, New York
Client :Ravi Engineering & Land Surveying, P.C. 2110 South Clinton Ave. Rochester, NY 14618
Elevation: Start: 12/8/25 Completed: 12/8/25 Driller: Jason Earsing
Water Level - During Drilling: 18'0" BGS Inspector:
Water Level - At Completion:15'0" BGS
Seasonal and climatic changes may alter observed water levels.

	C	Blows on Sampler 0"/6"	6"/12"	12"/18"	18"/24"	Sample N	Rec.	No	Depth	Visual Soil and Rock Information Remarks	
0		1	4							Topsoil and Organic Matter	0'6"
				2	2	6	12"	1	0'0"-2'0"	Light Brown Loose Dry Silt and M/F Sand	
		2	3							Little Gravel	
				4	5	7	18"	2	2'0"-4'0"	Light Brown Loose	
5		3	4								
				5	5	9	20"	3	4'0"-6'0"	Brown Loose Moist Silt and M/F Sand and Trace	
		4	3							Gravel	
				5	5	8	24"	4	6'0"-8'0"	Brown Loose Moist	
		2	3								
10				3	5	6	19"	5	8'0"-10'0"	Brown Loose Moist Silt and M/F Sand Trace	
		3	5							Gravel	
				4	4	9	22"	6	10'0"-12'0"	Brown Loose Moist	
		2	5								
15				7	8	12	24"	7	13'0"-15'0"	Brown Firm Moist Silt and M/F Sand Trace	
										Gravel	
		5	6								
20				6	7	12	22"	8	18'0"-20'0"	Brown Firm Moist	
											23'0"
		19	22							Brown Compact Wet C/M Gravel Little C/F Sand	
25				18	23	40	18"	9	23'0"-25'0"		
		17	18								29'0"
30				25	30	43	18"	10	28'0"-30'0"	Brown to Grey Dense Moist Silt and Sand Little	
										Clay Some C/F Gravel (Possible Till)	
35										Boring Terminated at 30'0" BGS	
										Boring Backfilled with Native Material	
40											

N = No. of Blows to Drive a 2" Spoon 12" with a 140 lb. Wt. 30"
Transitional Depths are Estimated Based on Field Observations

NOTHNAGLE *DRILLING*, INC.
1821 Scottsville-Mumford Road
Scottsville, New York 14546

Phone (585) 538-2328
Fax (585) 538-2357

Test Boring No B-1
Page 1 of 1
ND Job # 259140

Project :Proposed Restroom #3, Robert H. Treman State Park, Tompkins County, New York
Client :Ravi Engineering & Land Surveying, P.C. 2110 South Clinton Ave. Rochester, NY 14618
Elevation: Start: 12/8/25 Completed: 12/8/25 Driller: Jason Earsing
Water Level - During Drilling: N/A Inspector:
Water Level - At Completion:N/A
Seasonal and climatic changes may alter observed water levels.

	C	Blows on Sampler 0"/6"	6"/12"	12"/18"	18"/24"	Sample N	Rec.	No	Depth	Visual Soil and Rock Information Remarks
0		3	2							Topsoil and Organic Matter 0'8"
				3	4	5	12"	1	0'0"-2'0"	Light Brown Firm Dry Silt and M/F Sand
		7	5							Some Gravel
				7	6	12	13"	2	2'0"-4'0"	Light Brown Firm
5		12	6							
				7	7	13	15"	3	4'0"-6'0"	Brown Firm Moist Silt and M/F Sand and Gravel
		6	7							
				7	5	14	18"	4	6'0"-8'0"	Brown Firm Moist
		5	3							
10				6	4	9	16"	5	8'0"-10'0"	Brown Loose Moist Silt and M/F Sand Trace
		7	5							Gravel
				4	5	9	14"	6	10'0"-12'0"	Brown Loose Moist
15										
20										
										Boring Terminated at 12'0" BGS
25										Boring backfilled with native material to surface
30										
35										
40										

N = No. of Blows to Drive a 2" Spoon 12" with a 140 lb. Wt. 30"
Transitional Depths are Estimated Based on Field Observations

SECTION 01 12 00

MULTIPLE CONTRACT SUMMARY

PART 1 - GENERAL

1.1 MWBE

A. Refer to front end specifications furnished by the NYSOPRHP for MWBE requirements.

1.2 PROJECT INFORMATION

A. Project identification:

1. Project Name: ROBERT TREMAN STATE PARK - RESTROOM #3
2. Project Location: ROBERT TREMAN STATE PARK, 105 ENFIELD FALLS RD, ITHACA, NY 14850
3. Project Number: FL-RT-2026-001

B. Director

1. New York State Office of Parks, Recreation and Historic Preservation.
2. Director's Representative/Project Coordinator: Mikayla Elliott, Mid-State Capital District, Assistant Architect; New York State Office of Parks, Recreation and Historic Preservation, Finger Lakes Region, 2221 Taughannock Park Rd. Trumansburg, NY 14886.

C. Architect:

1. Beardsley Design Associates, Architecture, Engineering, Landscape Architecture, D.P.C., 115 Solar St., Suite 102, Syracuse, NY 13204.
2. Architect's Representative: Barry Halperin, RA.

1.3 PROJECT COORDINATOR

A. Project coordinator shall be responsible for coordination between all contracts.

1. Project coordinator is the Director's Representative.

1.4 PROJECT COORDINATOR RESPONSIBILITIES

A. Coordination activities of project coordinator include, but not limited to, the following:

1. Provide typical overall coordination of the Work.
2. Coordinate shared access to workspaces.
3. Provide overall coordination of temporary facilities and controls.

4. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
5. Coordinate construction and operations of the Work with work performed by each Contract.
6. Assist in the resolution of scheduling conflict.
7. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
8. Coordinate completion of substantial completion punch list items.
9. Coordinate preparation of Project Record Documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.

1.5 CONTRACT DURATION AND COMPLETION MILESTONES

A. The completion date for this project is 525 Days after the agreement has been approved by the NYS Comptroller's Office.

1. Anticipated Contract Approval: 01/27/2027

2. Building substantial completion by 12/17/2027

3. Sitework substantial completion by 05/01/2028

4. Anticipated Contract End: 07/05/2028.

1.6 GENERAL REQUIREMENTS OF CONTRACTS

B. Extent of Contract: Unless the Agreement contains a more specific description of the Work of each Contract, requirements indicated on Drawings and in Specification Sections determine which contract includes a specific element of Project.

1. Unless otherwise indicated, the work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
2. Trenches and other excavation for the work of each contract shall be the work of each contract for its own work, unless noted otherwise. Notable exception is that excavation, backfill, compaction, and final surface treatments for electrical conduits are by the GCW.
3. Blocking, backing panels, sleeves, and metal fabrication supports for the work of each contract shall be the work of the General Construction Contract, unless noted otherwise. Each prime contractor shall coordinate the need of blocking, backing, sleeves, and supplies for their work with the General Construction Contractor.
4. Equipment pads for the work of each contract shall be the work of each contract for its own work, unless noted otherwise.
5. Painting for the work of each contract shall be the work of each contract for its own work, unless noted otherwise.
6. Cutting and Patching: Provided by the General Construction Contract.

C. Project Information Sign: Refer to Specification Section 01 50 00 “Temporary Facilities and Controls”.

D. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the work.

1. The Prime Contractor proposing a substitution shall coordinate that substitution.

E. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Section 01 50 00 "Temporary Facilities and Controls," and 01 51 00 “Temporary Utilities” each Prime Contractor is responsible for the following:

1. Installation, operation, maintenance, and removal of each temporary facility necessary for its own normal construction activity, and costs and use charges associated with each facility, except as otherwise provided for in this Section.
2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
3. Its own field office, complete with necessary furniture, utilities, and telephone service.
4. Its own storage and fabrication sheds, if desired.
5. Temporary enclosures for its own construction activities.
6. Staging and scaffolding for its own construction activities.
7. General hoisting facilities for its own construction activities.
8. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials. Location to be approved by Director’s Representative.
9. Progress cleaning of work areas affected by its operations on a daily basis.
10. Secure lockup of its own tools, materials, and equipment.
11. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.

F. Temporary heating, Cooling, and Ventilation exceeding the temperature or air change levels defined in Section 01 50 00 or 01 51 00, is the responsibility of the Contractor requiring this heating, cooling, or ventilation. NYSOPRHP is not responsible for temporary heating or HVAC costs.

G. Each contractor shall provide portable generator(s) for their electrical power requirements in excess of those defined in Section 01 50 00, Temporary Facilities and Controls, or 01 51 00 Temporary Utilities.

H. Each contractor shall provide additional temporary electric branch distribution if distribution defined in Section 01 50 00 Temporary Facilities and Controls, or 01 51 00 Temporary Utilities is not adequate for their needs.

1.7 CONTRACT DESCRIPTION

A. Contract Type: Multiple Prime Contracts as described in each Contract Agreement.

B. The work of each separate Prime Contract is identified in this section and on the Drawings.

1.8 WORK BY DIRECTOR

A. Director will provide special testing and inspections as specified. In addition, the Director will provide QC testing for concrete, earthmoving, and asphalt paving. All other testing and inspections required as noted in the Contract Documents is by each Prime Contractor for their respective trade Work.

B. Director will cut down and remove trees within the project area as indicated on the Contract Drawings. The General Contractor shall remove the tree stumps per the Contract Drawings.

1.9 INFORMATION SUBMITTALS

A. For all hazardous materials brought onto the site, submit a material safety data sheet.

1.10 COORDINATION WITH OWNER

A. General: Cooperate fully with Director so work may be carried out smoothly, without interfering with or delaying work under each Prime Contract. Coordinate the Work of each Contract with Director and other Prime Contractor.

1.11 COMPLETION DATE

A. Completion date stated in the Contract Agreement is the project completed date.

1.12 USE OF SITE AND PREMISES

A. No Smoking Policy: Smoking is banned in NYS Parks at playgrounds, swimming pools, specific swimming beaches, pavilions, and picnic shelters; developed athletic facilities; boardwalks; outdoor seating areas near food and beverage concessions; areas where outdoor environmental education programs are held; public gardens; areas where children or large numbers of visitors congregate; and within 50-feet of buildings, including buildings under construction.

B. Courteous Behavior: Wellesley Island State Park is open to the public year-round. Contractors shall be watchful and courteous of Park Patrons and visitors, and shall make every reasonable attempt to accommodate. Harassment, disrespectful behavior and unsafe behavior will not be tolerated.

C. Construction Operations: Limited to areas noted on Drawings.

D. Arrange use of site and premises to allow:

1. Work by other Prime Contractors, for this project.

2. Work by Director.
3. Continued use of the Park by Park Patrons, including the existing Park Office and its public parking lot. The Park is open from dawn to dusk year-round, and receives heavy visitation.
4. Work by other Prime Contractors for other projects.

E. Provide access to and from site as required by law and by Director:

1. Do not obstruct roadways, sidewalks, or other public ways without permit.
2. Schedule deliveries to minimize use of driveways and entrances by construction operations.

F. Existing building spaces may not be used for storage.

1. Store materials and perform work so that pedestrians and vehicle traffic is not obstructed. Store materials in an orderly fashion.

G. Time Restrictions:

1. Conduct work to the hours of 7:30 AM to 4:30 PM, Monday through Friday, unless noted otherwise by Director.

H. Utility Outages and Shutdown:

1. The existing Park Office's sanitary sewer services shall not be disrupted at any time.
2. Limit disruption of other utility services to hours the site is unoccupied.
3. Do not disrupt or shut down life safety systems without 7 days notice to Director and authorities having jurisdiction.
4. Limit shutdown of utility services to 4 hours at a time, arranged at least 24 hours in advance with Director, unless noted otherwise on Drawings.
5. Prevent accidental disruption of utility services to other facilities.

I. The following items are not allowed on the Site or on Facility premises.

1. Firearms, ammunition, weapons, and dangerous instruments (other than tools required for the Work).
2. Alcoholic beverages and person under the influence of same.
3. Use of tobacco products and other controlled substances.
4. Illegal controlled substances and persons under the influence of same.
5. Radios (except with written permission from the Director's Representative).

J. Do not diminish the level of life safety during performance of the Work.

K. Portable equipment which interferes with execution of the Work will be removed and reset by Facility personnel.

L. Be responsible and accountable for employees, suppliers, subcontractors and their employees, with regard to their use of the premises. Direct them to comply with the Facility Regulations and with the security and traffic regulations.

M. Furnish Facility authorities with a telephone number or method to contact the supervisor for the Work in case of an emergency after work hour, including weekends and holidays.

N. Comply with applicable Federal and State of New York Right-to-Know Law provisions and supply copies of the appropriate Material Safety Data Sheets (MSDS) to the Director's Representative.

O. Direct employees to be watchful for people in or near the work area where safety hazards may be present. Notify the Director's Representative, if necessary, to remove them from the work area or Site.

P. Report fire and other emergency situations to the Facility Safety/Security Department immediately.

Q. Provide portable fire extinguishing equipment at the project site.

1.13 CONFINED SPACE

A. Comply with confined space as defined in Title 29, Part 1910, Section 146 of the Code of Federal Regulations (29CFR 1910.146).

B. Indicated confined spaces are not intended to limit or define Contractor's or subcontractor's regulatory compliance requirements. In addition, confined spaces indicated on the drawings, other confined spaces may be present or created by the work of this contract. Notify the Director's Representative, in writing, of confined spaces created or eliminated during execution of the Work.

1.14 SPECIFICATION AND DRAWING CONVENTIONS

A. Comply with the requirements of the various specifications and standards referred to in these Specifications, except where they conflict with the requirements of these Specifications. Such reference specifications and standards shall be the date of latest revision in effect at the time of receiving bids, unless the date is given.

B. NYSDOT Specifications: If the abbreviation NYSDOT appears in these Specifications, it shall mean the New York State Department of Transportation, Office of Engineering Specifications entitled "STANDARD SPECIFICATIONS - CONSTRUCTION AND MATERIALS" latest editing, including all applicable Addenda in effect at the time of receipt of bids. The NYSDOT specifications may be purchased from the Department of Transportation, Plan and Publication Sales, 1220 Washington Ave., Albany, NY 12232-0204, (518) 457-2124.

C. 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.

D. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

E. 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 schedule shown on the Drawings or reasonably inferred.

1.15 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

A. Unless otherwise noted, all provisions of Divisions 0 and 1 apply to all contracts. Specific items of work listed in Division 0 or 1 specification sections or under individual contract descriptions constitute exceptions.

B. The Project consists of the following separate Contracts:

General Contract Work **(GCW)**	Contract Number D006612
Electrical Contract Work **(ECW)**	Contract Number D006613
Plumbing Contract Work **(PCW)**	Contract Number D006615
Heating Ventilating, and Air Conditioning **(HCW)**	Contract Number D006614

1.16 CONTRACT NUMBER D006612 - GENERAL CONSTRUCTION CONTRACT WORK (GCW)

A. Refer to Section 00 01 15 List of Drawings, for drawings included in General Construction Contract.

1. Refer to Drawing title sheet for list of drawings included in the General Construction Contract.

B. Refer to Table 1, Table of Specification Sections, at end of this section for specification sections assigned to this Contract.

1. All specification sections marked **GCW** in specification footer are assigned to the Contract.

C. Temporary facilities and controls in the General Construction Contract include, but are not limited to, the following:

1. Temporary facilities and controls that are not otherwise specifically assigned to the Plumbing Contract, HVAC Contract, or Electrical Contract.
2. Sediment and erosion control.
3. Unpiped sewers and drainage, including drainage ditches.
4. Stormwater control.
5. Unpiped temporary toilet fixtures, wash facilities, and drinking water facilities, including disposable supplies.
6. Temporary enclosure for building exterior, except as indicated.
7. Temporary roads and paved areas.
8. Dewatering facilities and drains.
9. Excavation support and protection, unless required solely for the Work of another contract.
10. Project identification signs. Refer to Specification Section 01 50 00 “Temporary Facilities and Controls”.
11. General waste disposal facilities.
12. Temporary fire-protection facilities.
13. Barricades, warning signs, and lights.
14. Temporary chain link security fence and gates around project work limits.
15. Security enclosure and lockup.
16. Environmental protection, including all water bodies.
17. Restoration of Director’s existing facilities used as temporary facilities.

D. Summary of Work

1. General Contract Work

a. Contract includes all work not specifically assigned to any other Contract and includes but is not limited to: Providing all labor, material, and equipment necessary for the construction of the Restroom #3 building, and miscellaneous site improvements as shown.
b. General Contract Work includes site utilities (sewer and water), and extending the water lines into the footprint of the buildings for termination by the PCW. The sewer lines are to be extended up to and including the cleanouts.
c. General Contract Work includes demolition and removal and/or relocation of existing site utilities and structures (water, sewer, electrical), asphalt pavements, concrete pads, vegetation and tree stumps.
d. General Contract Work includes coordinating work with Other Trade Contracts.
e. General Contract Work includes pavement reconfiguration and landscaping around the building and site as specified.
f. General Contract Work includes all site preparation work as shown on the Drawings unless otherwise indicated.
g. General Contract Work includes all erosion sedimentation and pollution control work as shown on the Drawings unless otherwise indicated.
h. General Contract Work includes all earthwork as shown on the Drawings unless otherwise indicated.
i. General Contract Work includes all storm water drainage infrastructure work as shown on the Drawings unless otherwise indicated.

j. General Contract Work includes all work associated with the extension of the sanitary waste system.
k. General Contract Work includes providing extension of existing potable water line from the existing service lines.
l. General Contract Work includes all site improvements work indicated on the Drawings.
m. General Contract Work includes all lawn, vegetative ground cover and landscape planting work.
n. General Contract Work includes providing excavation, backfill, compaction, final grading, and surface treatments for electrical conduits, manholes, handholes, and light poles installed on the site by the ECW.
o. General Contract Work includes providing concrete foundations for light poles.
p. General Contract Work includes the mounting structure for the new and replacement A-frames.

1.17 CONTRACT NUMBER D006615 - PLUMBING CONTRACT (PCW)

A. Refer to Section 00 01 15 List of Drawings for Drawings included in the Plumbing Contract.

1. Refer to Drawing Title Sheet for list of drawings included in the Plumbing Contract.

B. Refer to Table 1, Table of Specification Sections, at the end of this section for specification sections assigned to this Contract.

1. All specification sections marked **PCW** in specification footer are assigned to the Contract.

C. Summary of Work

1. Plumbing Contract Work:
   a. Plumbing Contract Work includes coordinating work with other trade contracts.
   b. Plumbing Contract Work includes furnishing and installing all items as specified and shown on the Drawings for the following:
      1) Work includes providing all labor, material, and equipment necessary for installing domestic water piping, valves, fixtures, hot water heaters and connections, as well as all sanitary piping, and sanitary connections.
      2) Work includes connection to potable water and sanitary sewer provided to the building footprint by the GCW.

1.18 CONTRACT NUMBER D006614 - HVAC CONTRACT (HCW)

A. Refer To Section 00 01 15, List of Drawings, for Drawings included in the HVAC Contract.

1. Refer to Drawing Title Sheet for list of drawings included in the HVAC Contract.

B. Refer to Table 1, Table of Specification Sections, at end of this section for specification sections assigned to this Contract.

1. All specification sections marked **HCW** in specification footer are assigned to the Contract.

C. Summary of Work

1. HVAC Contract Work

a. Contract includes but is not limited to: Providing all labor, material, and equipment necessary for installing: all air cooled condensing units, fan coiled units exhaust fans, ductwork, grills, ventilation fans, electric heaters, and makeup and energy recovery units. Include all required concrete mounting pads.
b. HVAC Contract Work includes coordinating work with other trade contracts.
c. HVAC Contract Work includes furnishings and installing all items as specified and shown on the Drawings.
d. Where the terms “HVAC” or “Heating, Ventilating, and Air Conditioning” are used, these refer to Mechanical Contractor Work (HCW).

1.19 CONTRACT NUMBER D006613 - ELECTRICAL CONTRACT (ECW)

A. Refer to Section 00 01 15, List of Drawings, for Drawings, included in the Electrical Contract.

1. Refer to Drawing Title Sheet for list of drawings included in the Electrical Contract.

B. Refer to Table 1, Table of Specification Sections, at end of this section for specification sections assigned to this Contract.

1. All specification sections marked **ECW** in specification footer are assigned to the Contract.

C. Temporary facilities and controls in the Electrical Contract include, but are not limited to, the following:

1. Electric power service and distribution.
2. Lighting.
3. Electrical connections to existing systems and temporary facilities and controls furnished by the General Construction Contract, Plumbing Contract, HVAC Contract, and Electrical Contract.

D. Summary of Work

1. Electrical Contract
a. Contract includes but is not limited to: Providing all labor, material, and equipment necessary for installing: all wiring, switches, outlets, boxes, light fixtures, and data outlets, for the new Building.
b. Contract Work includes providing cabling conduit and utility interface for providing electrical service to the new building.
c. Electrical Contract Work includes coordinating work with other trade contracts.

d. Electrical Contract Work also includes furnishing and installing all items specified and shown on the Drawings for the following: electrical equipment, and HVAC equipment.
e. Electrical Contract Work includes providing site conduits, manholes, handholes, wire, and grounding.
f. Electrical Contract Work includes providing new and replacement devices at site A-frames.
g. Electrical Contract Work includes coordinating with NYSEG to obtain new electrical service at building.

1.20 OPENINGS AND CHASES FOR NEW CONSTRUCTION

A. General Work Contract

1. Unless specifically indicated otherwise, provide openings, chases and similar items in new construction provided under this Contract, as required for items to be provided under related contracts.
2. After the installation and completion of the items for which openings and chases have been provided, build in, over, around and finish the openings and chases to complete the Work.
3. Provide all cutting, patching, and refinishing resulting from the failure to provide the required openings and chases, if the necessary information was furnished by the related Contractor before 24 hours of start of the applicable part of the Work.
4. If related Contractors fail to furnish drawings or written information covering the openings and chases they require in new construction at least 24 hours before installation of the Work affected those items, the related Contractors will be required to do all cutting, patching, and refining of the construction so affected, at their own expense.

B. Plumbing Work, HVAC Work and Electrical Work Contracts:

1. Unless specifically indicated otherwise, furnish drawings or written information to the General Work Contractor covering the openings and chases required in new construction for the Work. If such information is not furnished at least 24 hours before start of the applicable part of the General Work Contractor's Work, all necessary cutting, patching, and refinishing will be included in the Contract at no additional cost to the Director.

1.21 LAYOUT WORK

A. Examine the Contract Documents thoroughly and promptly report any errors or discrepancies to the Director’s Representative before commencing the Work.

B. Layout the Work in accordance with the Contract Documents.

1. Take elevations and locations from benchmarks indicated in the Contract Documents.

1.22 CONTRACTOR'S MANAGEMENT

A. All Contracts

1. Provide continual on site project management for the Work, with qualified staffing personnel that are employees of the Prime Contractor.
2. The onsite Project Manager or Superintendent shall have the authority to direct the Work, and make purchase and cost decisions on behalf of the Prime Contractor.
3. Requests for modifications to the specified management staffing, must be approved by the Director's Representative.
4. Management Staffing Time Periods and Personnel
   a. Initial Job Meeting to Substantial Completion: Maintain at the site, a full-time Project Manager or Superintendent for the Contractor's staff, and Subcontractors staff while Work is in progress.
   b. Substantial Completion to Physical Completion: Maintain at the site a full-time project manager/superintendent while Work is in progress.

1.23 SPECIAL INSPECTIONS

A. Special Inspections and Tests are required by Chapter 17 of the Building Code of New York State (BCNYS), 2020. A STATEMENT OF SPECIAL INSPECTIONS is included as part of the Contract Documents, refer to Specification Section 01 41 00, Special Inspections and Structural Testing. Inspections and Testing Services required to satisfy the STATEMENT OF SPECIAL INSPECTIONS will be provided and paid for by the Director unless otherwise noted.

B. Contractors are responsible for notifying the Director's Representative regarding individual inspections listed in the STATEMENT OF SPECIAL INSPECTIONS. Contractors shall cooperate with the inspectors and testing agencies and sufficient notice and lead time (minimum 48 hours) must be allowed for inspection and testing to be performed.

C. Where deficiencies are identified, the Contractor must take corrective actions to comply with the Contract Documents.

D. Building commissioning inspections are addressed elsewhere in the specifications, and are a responsibility of the owner, but all contractors shall coordinate and facilitate these tests.

1.24 OTHER TESTING AND INSPECTIONS

A. Testing and inspections noted in the Contract Documents that are not identified as Special Inspections are the responsibility of each Prime Contractor for their work specified unless noted otherwise. These testing and inspections services that are not Special Inspections shall be paid by the Contractor.

1. Testing or inspections identified as by Owner or Director will be paid by Director.

1.25 TABLE OF SPECIFICATION SECTIONS

A. Table 1 defines the specification sections assigned to each Prime Contract. Refer to Table 2 for Key Note Legend.

DIVISION		GENERAL CONSTRUCTION	PLUMBING	HVAC	ELECTRICAL
No.	TITLE				
01	General Requirements	X	X, 7	X, 7	X, 7
02	Existing Conditions	X			
03	Concrete	X	1	1	1
05	Metals	X			
06	Wood, Plastics, and Composites	X	2	2	2
07	Thermal and Moisture Protection	X	3, 4	3, 4	3, 4
08	Openings	X			
09	Finishes	X			6
10	Specialties	X			
12	Furnishings	X			
22	Plumbing		X		
23	Heating, Ventilating and Air Conditioning			X	
26	Electrical			9	X, 5
27	Communications				X
31	Earthwork	X	6		
32	Exterior Improvements	X			
33	Utilities	X			
34	Transportation	X			

Key Note No.	Table 2 Key Note Information
X	= Division applies to this Contract
1	= Section 03 30 00, Cast-in-Place Concrete, applies to this Contract for equipment pads and other minor concrete work associated with this Contract
2	= Section 06 10 00, Rough Carpentry, applies to the General Construction

	Contract for wood blocking and wood backing panels required to support Work by other Contracts.
3	= Section 07 62 00, Sheet Metal Flashing and Trim, and 07 71 00, Roof Specialties, applies to the General Construction Contract for flashing boots for penetration of roofs, where the penetrating item is required for Work by other Contracts.
4	= Section 07 92 00, Joint Sealants, applies to the General Construction Contract for sealant at non-fire rated penetrations where the penetrating item is required for Work by other Contracts.
5	= Section 09 91 23, Interior Painting, applies to this Contract for painting of the Work of this Contract.
6	= Section 31 20 00, Earth Moving applies to this Contract for trenching and backfill required for the Work of this Contract.
7	= All sections in this division apply to this Contract for cutting and patching associated with this Contract.
8	= Section 22 91 26 Facility Liquified Petroleum Gas Piping applies to this Contract.
9	= Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables applies to this Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's construction schedule.

1. Coordinate line items in the Schedule of Values with items required to be indicated as separate activities in Contractor's construction schedule.
   a. Application for Payment forms with continuation sheets.
   b. Submittal schedule.
   c. Items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the Schedule of Values to the Director at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the Schedule of Values. Coordinate with NYSOPRHP to determine whether schedule will include separate entries for materials and labor.

1. Identification: Include the following Project identification on the schedule of values:
   a. Project name and location.
   b. Name of Director and Director’s Representative
   c. Director’s Project number.
   d. Name of Architect.
   e. Contractor's name and address.
   f. Date of submittal.
2. Arrange Schedule of Values per form furnished by the Director’s Representative.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual’s Table of Contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
4. Round amounts to the nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed. Note that in order to be eligible for payment, materials stored off-site must be stored in an insured facility, and photographic documentation of the stored items shall be provided.
   a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the

Work. Include separate costs for materials, installation labor, and maintenance during construction, if applicable.

7. Each item in the Schedule of Values and applications for payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the Schedule of Values before the next applications for payment when change orders or construction change directives result in change in the Contract Sum. Pay applications will not be processed without submission of an updated Schedule of Values.

1.2 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Director's Representative and paid for by Director.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Director and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

    1. Submit draft copy of Application for Payment seven days prior to due date for review by Director's Representative.

C. Application for Payment Forms: Use forms as provided by NYSOPRHP.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Director's Representative will return incomplete applications without action.

    1. Entries shall match data on the Schedule of Values and Contractor's construction schedule. Use updated schedules if revisions were made.
    2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
    3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
    4. Indicate separate amounts for work being carried out under Director-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Director, and consent of surety to payment for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:
   a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
   b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
   c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Director's Representative by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Submittal schedule (preliminary if not final).
5. Copies of building permits.
6. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
7. Initial progress report.

1.3 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

A. Application for Payment at Substantial Completion: After Director's Representative issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Substantial Completion issued previously for Director occupancy of designated portions of the Work.

1.4 FINAL PAYMENT APPLICATION

A. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. “Contractor’s Affidavit of Payment of Debts and Claims” form, as furnished by NYSOPRHP.
5. “Contractor’s Affidavit of Release of Liens” form, as furnished by NYSOPRHP.

1.5 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive changes to the Documents and who will be responsible for informing Contractor's employees or Subcontractors of changes to the Work.

B. Director's Representative will advise of minor changes in the Work not involving an adjustment to Contract Price or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on form as furnished by the Director’s Representative.

C. Construction Change Directive: Director's Representative may issue a document, signed by Director, instructing Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The document will describe changes in the Work, and will designate method of determining any change in Contract Price or Contract Time.
2. Promptly execute the change in Work.

D. Proposal Request of Notice of Change: Director's Representative may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change. Contractor shall prepare and submit a fixed price quotation within 4 days.

E. Contractor may propose a change by submitting a request for change to Director's Representative, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation.

F. Computation of Change in Contract Amount:

3. For change requested by Director's Representative for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
4. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Director's Representative.

5. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.

A. Substantiation of Costs: Provide full information required for evaluation.

6. On request, provide following data:
7. Support each claim for additional costs with additional information.

B. Execution of Change Orders: Director's Representative will issue Change Orders for signatures of parties as provided in the Conditions of the Contract on form as furnished by the Director's Representative.

C. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price.

D. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

E. Promptly enter changes in Project Record Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 PROJECT COORDATION

A. Project Coordinator: Director's Representative.

1. Cooperate with the Director's Representative in allocation of mobilization areas of site; for field offices and sheds, for site access, traffic, and parking facilities.
2. During construction, coordinate use of site and facilities through the Director's Representative.
3. Comply with Director's Representative procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
4. Comply with instructions of the Director's Representative for use of temporary utilities and construction facilities.
5. Coordinate field engineering and layout work under instructions of the Director's Representative.

B. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. The Director's Representative / Construction Manager shall prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Project closeout activities.

7. Startup and adjustment of systems.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials. Coordinate use of temporary utilities to minimize waste.

1.2 INFORMATIONAL SUBMITTALS

A. Make the following types of submittals to the Director through the Director's Representative.

1. Requests for interpretation.
2. Requests for substitution.
3. Shop Drawings, product data, and samples.
4. Test and inspection reports.
5. Design Data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination Drawings.

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

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

1.3 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.

1.4 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI to the Director.

1. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Contractor Number.
4. Date.
5. Name of Contractor.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. Director’s Representative will review each RFI, determine action required, and respond. Allow seven days for Director’s Representative response for each RFI. RFIs received by Director’s Representative after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:
    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Incomplete RFIs or inaccurately prepared RFIs.

2. Director's action may include a request for additional information, in which case Director's Representative time for response will date from time of receipt of additional information.
3. Director's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Change Proposal.
    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Director in writing within 10 days of receipt of the RFI response.

D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at each project meeting.

1.5 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Director and Director's Representative of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Director and Director's Representative within three days of the meeting.

B. Preconstruction Conference: Director's Representative will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Director's Representative, but no later than 15 days after execution of the Agreement.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Director and Director's Representative of scheduled meeting dates and times.
2. Agenda: Prepare the agenda, distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved, distribute the meeting minutes to everyone concerned, including Director and Director's Representative within three days of the meeting.

C. Preconstruction Conference: Director's Representative will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Director and Contractor, but no later than 15 days after execution of the agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Director, Director's Representative and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:
    a. Tentative construction schedule.

b. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Lines of communication.
f. Procedures for processing field decisions and change orders.
g. Procedures for RFIs.
h. Procedures for testing and inspecting.
i. Procedures for processing applications for payment.
j. Distribution of the Contract Documents.
k. Submittal procedures.

4. Minutes: Director's Representative responsible for conducting meeting will record and distribute meeting minutes.

D. Progress Meetings: Project meetings will be held at the job site at a frequency as determined by the Director's Representative as warranted by the stage and activity of construction generally, bi-weekly meetings may be anticipated.

1. Coordinate dates of meetings with preparation of payment requests.
2. Director's Representative will make arrangements for meetings, and prepare agenda with copies for participants presiding at meetings.
3. Attendees: Shall include Contractors or his duly authorized representative such subcontractor representatives as may be needed, the Director's Representative, and any other interested party, public utility, local governmental representatives, and suppliers when needed.
4. Agenda:
   a. Review minutes of previous meetings.
   b. Review of work progress.
   c. Field observations, problems, and decisions.
   d. Identification of problems which impede planned progress.
   e. Review of submittals schedule and status of submittals.
   f. Review of off-site fabrication and delivery schedules.
   g. Maintenance of progress schedule.
   h. Corrective measures of regain projected schedules.
   i. Planned progress during succeeding work period.
   j. Coordination of projected progress.
   k. Maintenance of quality and work standards.
   l. Effect of proposed changes on progress schedule and coordination.
   m. Other business relating to work.
5. The Director's Representative will record minutes of the meetings and distribute copies to all attendees and others affected by the decisions or actions resulting from each meeting.
6. In the absence of the Director's Representative, the Contractor will record the minutes of the meetings.
7. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 50

CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Submit updated schedule with each Application for Payment.

1.2 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Sheet Size: Multiples of 8-1/2 x 11 inches.

C. Scale and Spacing: To allow for notations and revisions.

PART 2 - PRODUCTS – (Not Used)

PART 3 - EXECUTION

3.1 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart or preliminary network diagram.

3.2 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

1. Coordinate schedule with sequence of installation shown on Contract Drawings.

B. Identify work of separate stages and other logically grouped activities.

C. Include conferences and meetings in schedule.

D. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

E. Coordinate content with Schedule of Values.

F. Provide legend for symbols and abbreviations used.

3.3 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Director's Representative at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.4 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Update diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial and Final Completion.

3.5 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, Suppliers, Director's Representative, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Director's Representative, Architect/Engineer's and /or Landscape Architects responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Director's Representative, Architect/Engineer's and /or Landscape Architects responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.2 ACTION SUBMITTALS

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

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal Schedule: Submit within 14 days of date established for commencement of work.
3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule and prior to first Application for Payment.
   a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal Category: Action; informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Director's Representative final release or approval.
   g. Scheduled date of fabrication.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule. Submit items from closely related sections concurrently.
3. Submit each submittal required by the same Specification Section under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Director's Representative receipt of submittal. Director's Representative will transmit submittals to Architect/Engineer or Landscape Architect for review immediately following receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Director's Representative will advise each Prime Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 days for review of each resubmittal.

C. Identification and Information: Attach a Submittal Transmittal, using the form indicated in the Project Manual, to each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal. Complete all information required on this form.

D. Options: Identify options requiring selection by Director's Representative.

E. Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Director's Representative on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

F. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are approved by Director's Representative.

G. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

H. Use for Construction: Retain complete copies of submittals on Project Site. Use only final action submittals that are marked with approval notation from Director's Representative.

1.4 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. General: Electronic submittals are preferred over paper media. Include applicable specification division and revision number in the file naming for electronic submittals.
2. Action Submittals: Submit electronic file or four paper copies of each submittal, unless otherwise indicated. Director's Representative will return the file or two copies.
3. Informational Submittals: Submit electronic file or two paper copies of each submittal, unless otherwise indicated. Director's Representative will not return file or copies.
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

1.5 SUBMITTAL PROCEDURES FOR ACTION SUBMITTALS

A. Product Data: Collect information into a single submittal for all elements of construction and types of product or equipment specified under a given section. These are considered Action submittals.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications.
   c. Standard color charts, if applicable.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.
   f. Application of testing agency labels and seals.
   g. Notation of coordination requirements.
4. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams showing factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.

d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

B. 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. These are considered Action submittals.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed. These are considered Action submittals.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for Contractor's Work and their intended location. These are considered Action submittals. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

5. Other information as required by individual specification section.

E. Coordination Drawing Submittals: Comply with requirements specified in Division 01 Section “Project Management and Coordination.”

F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Schedule."

G. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section “Closeout Procedures”.

I. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required. These are considered Information submittals.

J. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents. These are considered Information submittals.

K. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents. These are considered Information submittals.

L. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency. These are considered Information submittals.

M. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents. These are considered Information submittals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

NEW YORK STATE OF OPPORTUNITY. | Parks, Recreation and Historic Preservation

SUBMITTAL COVER SHEET - FORM OPR 107A

THIS FORM SHALL BE COMPLETED AND ATTACHED TO EACH SUBMISSION OR MULTIPLE SUBMISSIONS OF SHOP DRAWINGS, MATERIAL SAMPLES AND/OR PRODUCT INFORMATION.

DATE OF SUBMITTAL _____ **CONTRACT NO.** _____

SUBMITTAL DESCRIPTION/CONTENT/ITEM (ATTACH ADDITIONAL SHEETS AS NECESSARY)

SUBMITTAL LOG REFERENCE NUMBER _____

SPECIFICATION REFERENCE _____

DRAWING OR DETAIL REFERENCE _____

Contractors Review & Approval Statement

The above listed submission(s) are approved to be in accordance with the Contract Documents except as noted. By the signature below, the Contractor represents that he/she has reviewed and coordinated the information contained in this submittal with the requirements of the work and the contract documents and; has determined and verified all field measurements, quantities, field construction criteria, materials, catalog numbers and similar data.

_____ _____

CONTRACTOR'S SIGNATURE **DATE** **REVIEWED BY** **DATE**

ARCHITECT/ENGINEER/DIRECTOR'S REPRESENTATIVE ACTION STAMP

☐ Approved
☐ Approved as Noted
☐ Revise and Resubmit
☐ Rejected

Approval is only for general conformance with the design concept of the Project and the information given in the Contract Documents. Contractor is responsible for dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication process or to the means and methods of construction; coordination of the work of all trades; and performing all work in a safe and satisfactory manner. This approval does not modify Contractor's duty to comply with the Contract Documents.

Reviewer: **Review Date:**

NOTES:

THE CONTRACTOR IS NOT RELIEVED FROM COMPLIANCE WITH THE CONTRACT DOCUMENTS AND REMAINS SOLELY RESPONSIBLE FOR ALL COORDINATION, DIMENSIONS, QUANTITIES, ETC.

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Director's Representative.

C. Product Testing: Tests and inspections that are performed by, a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

D. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

E. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

G. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

H. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction**.**

1.2 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Director's Representative for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the

minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Director's Representative for a decision before proceeding.

1.3 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Contract number.
4. Name, address, and telephone number of testing agency.
5. Dates and locations of samples and tests or inspections.
6. Names of individuals making tests and inspections.
7. Description of the Work and test and inspection method.
8. Identification of product and Specification Section.
9. Complete test or inspection data.
10. Test and inspection results and an interpretation of test results.
11. Record of temperature and weather conditions at time of testing and inspection.
12. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement of whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.

3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Director's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.4 QUALITY ASSURANCE

A. General Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Testing and Inspecting Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspection indicated, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction.

F. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.5 QUALITY CONTROL

A. Director Responsibilities: Special Inspections, as outlined in Specification Section 01 41 00 Special Inspections and Structural Testing.

B. Contractor Responsibilities: All tests and inspections are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. engage a qualified testing agency to perform quality-control services.
3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. 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.

D. Testing Agency Responsibilities: Cooperate with Director’s Representative and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Director’s Representative and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.6 REGULATORY REQUIREMENTS

A. Regulations

1. Comply with all applicable Statutory Requirements including the following
   a. New York State Municipal Law
      1) Section S101, re: Separate Contracts

2) Section S103, re: Advertisement and Contract
3) Section S103, re: Equivalency (or equal) Clause
4) Section S103, re: Basis for Award of Contract
5) Section S103-d, re: Non-collusion
6) Section S106-b, re: Payment on Public Works Contracts
7) Section S108, re: Workman's Compensation Insurance
8) Section S109, re: Non-assignment of Public Contracts

b. New York State Labor Law
1) Section 220, subd. 2, 8 hour day, 5 day week
2) Section 220, subd. 3 & 220-d, re: Wage Rates
3) Section S220-e, re: Anti-discrimination
4) Section S222-e, re: Elimination of dust hazard
5) Section 220-h: OSHA 10 Hour Construction Safety and Health Course S1537-A
6) Title 12, Part 56, re: Asbestos

B. Codes

1. Conform to the requirements of all Federal, State, and local codes and ordinances.
2. Conform to the requirements of all public utility companies.
3. The requirements of the Building Code of New York State and related codes referenced in the above Code, apply to this Project.
   a. Electrical Code of New York State.
   b. Fuel Gas Code of New York State.
   c. Mechanical Code of New York State.
   d. Plumbing Code of New York State.
   e. Property Maintenance Code of New York State.
   f. Existing Building Code of New York State.
   g. Fire Code of New York State.
   h. Energy Conservation Code of New York State.
4. Conform to OSHA requirements including Part 1910 "General Industry" and Part 1926 "Construction".

C. Affirmative Action Program

1. No affirmative action program is required to be submitted with the Bid; however, the successful Contractor must comply with all county, regional, or state regulations, if any, that apply to the geographical location of this Project.
2. The Contractor shall be responsible for full compliance with the letter and the spirit of the Affirmative Action Program during the full period of the Contract

D. Permits, Fees, and Inspections

1. Building Permit and New York State Health Department Permit
   a. The Director shall file application and pay for the Building Permit and New York State Health Department Permit, if any.
2. Other Permits, Fees and Inspections

a. All permits (other than building permits), fees, and inspections required by Governmental agencies, regulatory agencies, utility companies, or others during the course of the work shall be obtained by the Contractor.
b. Contractor shall arrange for and pay all costs of such permits, fees, and inspections.

1.7 REFERENCES AND STANDARDS

A. Obtain copies of standards where required by product specification sections.

B. Should specified reference standards conflict with Contract Documents, request clarification from Director's Representative before proceeding.

1.8 DATES OF REFERENCED CODES AND STANDARDS

A. Codes and standards referred to in this specification shall be the latest adopted issue at date of bid, unless otherwise specifically indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Maintain inspection log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Director’s Representative reference during normal working hours.

C. Comply with manufacturer’s instructions, including each step in sequence.

D. Should manufacturer’s instructions conflict with Contract Documents, request clarification from Director's Representative before proceeding.

E. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Have Work performed by persons qualified to produce required and specified quality.

G. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

H. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 TOLERANCES

A. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Director's Representative before proceeding.

B. Adjust products to appropriate dimensions; position before securing products in place.

3.3 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

3.4 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of the Director’s Representative it is not practical to remove and replace the Work, the Contractor shall submit to the Director’s Representative a proposed remedy for Director’s Representative approval.

END OF SECTION

SECTION 01 41 00

SPECIAL INSPECTIONS AND STRUCTURAL TESTS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. International Building Code

1. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the International Building Code. References to "the Code" in this Section refer to the above code.

B. CASE National Practice Guideline for Special Inspection

1. Special Inspections and Structural Testing shall be in accordance with CASE National Practice Guideline for Special Inspections.

C. Quality Assurance

1. The program of Special Inspections and Structural Testing is a Quality Assurance program intended to ensure that the work is performed in accordance with the Contract Documents.

D. Owner’s Quality Assurance

1. This specification section is intended to inform the Contractor of the Director’s quality assurance program and the extent of the Contractor's responsibilities.

E. Requirements and Responsibilities

1. This specification section is also intended to notify the Special Inspector, Testing, and other Agents of the Special Inspector of their requirements and responsibilities.

1.2 QUALIFICATIONS

A. The Special Inspector shall be a licensed Professional Engineer or Structural Engineer who is approved by the Architectural Engineer of Record and the Director’s Representative.

B. The Testing Laboratory and individual technicians shall be approved by the Architectural Engineer of Record and the Director’s Representative.

C. The Testing Laboratory shall maintain a full time licensed Professional Engineer or Structural Engineer on staff who shall certify all test reports. The Engineer shall be responsible for the training of the testing technicians and shall be in responsible charge of the field laboratory testing operations.

D. Special Inspections shall be performed by inspectors who are either licensed Professional Engineers, Structural Engineers, or Engineers in Training with an education and background in structural engineering, except as indicated below.

1. Welding: Technicians performing visual inspections shall be AWS Certified Welding Inspectors or ICBO certified Structural Steel and Welding Special Inspectors. Technicians performing non-destructive testing such as ultrasonic testing, radiographic testing, magnetic particle testing or dye-penetrant testing shall be certified ASNT-TC Level II or Level III technician.

2. Technicians performing standard tests described by ASTM Standards shall have training in the performance of such tests and must be able to demonstrate either by oral or written examination competence for the test to be conducted. They shall be under the supervision of a licensed Professional Engineer and shall not be permitted to independently evaluate test results.

1.3 SUBMITTALS

A. Interim Reports of Special Inspection

1. Detailed daily reports shall be prepared of each inspection or test and assembled by the Special Inspector. Reports shall include:
   a. Date of test or inspection.
   b. Name of inspector or technician.
   c. Location of specific areas tested or inspected.
   d. Description of test or inspection and results.
   e. Applicable ASTM standard.
   f. Weather conditions.

2. At the end of each week the Special Inspector shall submit interim reports to the Director's Representative. These shall include all inspections and test reports received that week. Copies shall be sent to the Architect/Engineer and the Contractor.

3. Any discrepancies from the Contract Documents found during Special Inspection shall be immediately reported to the Contractor, Construction Manager, and the Architect/Engineer. If discrepancies are not corrected, the Special Inspector shall notify the Director's Representative. Reports shall document all discrepancies identified and the corrective action taken.

4. The Testing Laboratory shall immediately notify the Special Inspector and the Architect/Engineer by telephone, email, or fax of any test results which fail to comply with the requirements of the Contract Documents.

5. Reports shall be submitted to the Special Inspector within 7 days of the inspection or test. Hand written reports may be submitted if final typed copies are not available.

6. At the completion of the work requiring Special Inspections, each inspection agency and testing laboratory shall provide a statement to the Special Inspector that all work was

completed in substantial conformance with the Contract Documents and that all appropriate inspections.

B. Final Report of Special Inspections

1. A Final Report of Special Inspections shall be completed by the Special Inspector and submitted to the Architect/Engineer and the Director's Representative prior to the issuance of a Certificate of Occupancy.

2. Council of American Structural Engineers Form 101 -2004 shall be used for the Final Report of Special Inspections.

3. The Final Report of Special Inspections will certify that all required inspections have been performed and will itemize all discrepancies that were not corrected or resolved.

C. Qualifications

1. Special Inspector Qualifications

2. Testing Laboratory Qualifications
   a. The Special Inspector and Testing Laboratory shall submit to the Architect/Engineer and the Director's Representative for review a copy of their qualifications which shall include the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests.
   b. The Special Inspector and Testing Laboratory shall disclose any past or present business relationship or potential conflict of interest with the Contractor or any Subcontractors whose work will be inspected or tested.

1.4 PAYMENT

A. The Director will employ and pay for services of an independent testing agency to perform specified Special Inspections and Testing as indicated in this Specification Section.

B. Testing requested by Contractor for his information or convenience shall be paid for by Contractor.

C. When initial tests indicate non-compliance with Contract Documents, the Contractor is required to pay for all subsequent re-testing until compliance is accomplished.

D. When any materials which require Special Inspections are fabricated in a plant which is not located within 50 miles of the project, the Contractor shall be responsible for the travel expenses of the Special Inspector or Testing Laboratory.

1.5 CONTRACTOR RESPONSIBILITIES

A. Deliver to Special Inspector at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.

B. Cooperate with Special Inspector's or Testing Laboratory's personnel, and provide access to the Work and to manufacturers' facilities.

C. Incidental Labor and Facilities

1. To provide access to Work to be tested/inspected.

2. To obtain and handle samples at the site or at source of Products to be tested/inspected.

3. To facilitate tests/inspections.

4. To provide storage and curing of test samples.

D. Notify Director’s Representative and Special Inspector 48 hours prior to expected time for operations requiring testing/inspection services.

1. If after such notification the Special Inspector is prevented from performing its work due to incompleteness of the project work, all extra costs for testing attributable to the delay shall be paid by the Contractor.

E. Additional Special Inspections and Testing

1. Arrange with Director’s Representative and their testing agency, and pay for additional samples, tests, and inspections required by Contractor beyond specified special inspection requirements.

F. Keep at the project site the latest set of construction drawings, field sketches, approved shop drawings, and specifications for use by the inspectors and testing technicians.

G. The Special Inspection program shall in no way relieve the Contractor of his obligation to perform work in accordance with the Contract Documents or from implementing an effective Quality Control program and completing all required testing as indicated in the Contract Documents. All work that is subject to Special Inspections shall first be reviewed by the Contractor's quality control personnel prior to the Director’s Representative and Special Inspector performing their inspection.

H. The Contractor shall be solely responsible for construction site safety.

1.6 LIMITS ON SPECIAL INSPECTOR’S OR TESTING LABORATORY AUTHORITY

A. Special Inspection/Testing Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Special Inspection/Testing Agency may not approve or accept any portion of the Work.

C. Special Inspection/Testing Agency may not assume any duties of Contractor.

D. Special Inspection/Testing Agency has no authority to stop the Work.

E. Special Inspection/Testing Agency shall not have control over the Contractor's means and methods of construction.

F. Special Inspection/Testing Agency shall not be responsible for construction site safety.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SCHEDULE OF SPECIAL INSPECTIONS AND STRUCTURAL TESTING

A. Refer to Statement of Special Inspections at the end of this section for Special Inspections associated with the Building.

B. For Work associated with the site, provide inspection and testing as noted in their specific Specification Section. These testing items are not considered Special Inspections associated with the Building.

END OF SECTION

STATEMENT OF SPECIAL INSPECTIONS

Project:	ROBERT TREMAN STATE PARK -RESTROOM #3
Location:	ROBERT TREMAN STATE PARK, ITHACA, NY
Owner:	State of New York – Executive Department Office of Parks, Recreation and Historic Preservation
Engineer:	Beardsley Architects + Engineers

This Statement of Special Inspections is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this Project as well as the name of the Special Inspector and the identity of other approved agencies to be retained for conducting these inspections and tests. This Statement of Special Inspections encompasses the following disciplines:

☒ Structural ☐ Mechanical/Electrical/Plumbing
☐ Architectural ☐ Other: _____

The Special Inspector shall keep records of all inspections and shall furnish inspection reports to the Building Official and Engineer. Discovered discrepancies will be brought to the immediate attention of Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and Engineer. The Special Inspection program does not relieve Contractor of their responsibilities.

Interim reports will be submitted to the Building Official and Engineer.

A Final Report of Special Inspections documenting completion of all required Special Inspections will be submitted at completion of the project.

Means and methods of construction, including site safety, are solely the responsibility of the Contractor.

Interim Report Frequency: ☒ To be determined ☐ Per attached schedule

Prepared by:

Joseph S. Kime, P.E.

(Type Name)

9/11/2026

Signature Date

STATE OF NEW YORK
JOSEPH S. KIME
083481
LICENSED PROFESSIONAL ENGINEER
Seal
Exp. 02/01/2029

Owner's Authorization:

Signature Date

Building Official's Acceptance:

Signature Date

This Statement of Special Inspections/Quality Assurance Plan includes the following building systems:

- ☒ Soils and Foundations
- ☒ Cast-in-Place Concrete
- ☐ Precast Concrete
- ☐ Masonry
- ☐ Structural Steel
- ☐ Cold-Formed Steel Framing
- ☐ Spray Fire Resistant Material
- ☐ Wood Construction
- ☐ Exterior Insulation and Finish System
- ☐ Mechanical and Electrical Systems
- ☐ Architectural Systems
- ☐ Special Cases

Special Inspection Agencies	Firm	Address, Telephone, Email
1. Special Inspector	To Be Determined	
2. Inspector		
3. Inspector		
4. Testing Agency	To Be Determined	
5. Testing Agency		
6. Other		

Note: The inspectors and testing agencies will be engaged by Owner or the Owner's Agent, and not by Contractor or Subcontractor whose work is to be inspected or tested.

Quality Assurance for Seismic Resistance	
Seismic Design Category	B
Quality Assurance Plan Required	☐ Yes ☒ No
Description of seismic force resisting system and designated seismic systems.	☒ Not required ☐ See description below

Quality Assurance for Wind Requirements	
Nominal Wind Speed (V_{asd})	85 mph
Wind Exposure Category	B
Quality Assurance Plan Required	☐ Yes ☒ No
Description of wind force resisting system and designated wind resisting components.	☒ Not required ☐ See description below

Statement of Responsibility	
Each Contractor responsible for the construction or fabrication of a system or component designated above must submit a Statement of Responsibility.	☐ Required ☒ Not required

Item and Description	Agency	Frequency		Scope	Referenced Standard
		C	P		
1. **Structural Fill Material** Perform classification and testing of controlled fill materials.			X	Test fill material in accordance with ASTM and the Contract Documents. Perform sieve tests (ASTM D422 and D1140) and modified Proctor tests (ASTM D1557) of each source of fill material.	BCNYS – 1705.6
2. **Excavations** Verify excavations below all shallow foundations and slabs-on-grade.			X	Verify excavations are extended to proper depth and have reached proper material. Inspect removal of unsuitable material and preparation of subgrade prior to placement of controlled fill.	BCNYS – 1705.6
3. **Controlled Structural Fill Placement** Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill.			X	Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.	BCNYS – 1705.6
		X		Inspect placement, lift thickness, and compaction of controlled fill. Test density of each lift of fill by nuclear methods (ASTM D2922). Verify extent and slope of fill placement.	
4. **Shallow Foundations** Verify materials below footings are adequate to achieve the design bearing capacity.			X	Inspect soils below footings for adequate bearing capacity and consistency with geotechnical report.	BCNYS – 1705.6

Item and Description	Agency	Frequency		Scope	Referenced Standard
		C	P		
1. Reinforcement Inspect reinforcing steel and verify placement.			X	Rebar inspection and field inspection of placement	ACI 318 Ch. 20, 25.2, 25.3, 26.6.1-26.6.3 IBC 1908.4
2. Inspection of reinforcing steel welding A. Verify weldability of reinforcing bars other then ASTM A706			X		AWS D1.4 ACI 318: 26.6.4
B. Inspect single pass fillet welds maximum 5/16", and			X		
C. Inspect all other welds		X			
3. Inspect Anchors Cast in Concrete			X		ACI 318: 17.8.2
4. Post-Installed Anchors			X		ACI 318: 17.8.2.4, ACI 318: 17.8.2
5. Use of Required Design Mix			X		ACI 318: Ch. 19, 26.4.3, 26.4.4; IBC 1904.1, 1904.2, 1908.2, 1908.3
6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of concrete.		X			ASTM C172, ASTM C31; ACI 318: 26.4, 26.12; IBC 1908.10
7. Concrete Placement		X		Inspect concrete and shotcrete placement for proper application techniques.	ACI 318: 26.5; IBC 1908.6, 1908.7, 1908.8
8. Curing			X	Verify maintenance of specified curing temperature and techniques.	ACI 318: 26.5.3-26.5.5 IBC: 1908.9
9. Formwork			X	Inspect formwork for shape, location and dimensions of the concrete member being formed.	ACI 318: 26.11.1.2(b)

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

J. “Remove”: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

K. “Remove and Salvage”: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Director.

L. “Remove and Reinstall”: Detach items from existing construction, prepare for reuse, and reinstall in the same location.

M. “Remove and Relocate”: Detach items from existing construction, prepare for reuse, and reinstall in a new location as indicated.

N. “Existing to Remain”: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

O. “Replace”: Remove existing and provide new as indicated.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RESPONSIBILITIES

A. Installation, removal, and use of temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow others to use temporary services and facilities without cost, including, but not limited to, Director's Representative, testing agencies, and authorities having jurisdiction. The use charges in this article refer to those of commercial public utilities.

B. Water and Sewer Service from Existing System: Water from Director's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Director's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.2 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel. Submit for Director's Representative review.

B. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

C. Erosion and Sedimentation Control Procedures: Show compliance with requirements of State Pollutant Discharge Elimination System (SPDES) general permit or local authorities having jurisdiction, whichever is more stringent.

D. Moisture Protection: Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage, indicate procedures for discarding water damaged materials, protocols for mitigating water intrusion into completed work and replacing water damaged work.

E. Dust- Control: Submit narrative that describes dust-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. Waste-handling procedures.
3. Other dust-control measures.

1.3 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Contractor's on-site project manager shall assume responsibility for operation, maintenance, and protection of each permanent service during its use throughout construction. Restore permanent services to existing conditions upon completion of construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Barriers & Fencing:

1. Provide minimum 6'-0" steel chain link construction safety fencing supported by galvanized steel support posts.
2. Provide barricades and covered walkways required by Director's Representative and governing authorities for public right-of-way and for public access.
3. Furnish, install, and maintain for the duration of construction, all required warning signs, steps, bridges, platforms, and other temporary construction necessary for proper completion of the work in compliance with all pertinent safety and other regulations.

B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

C. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.

2.2 TEMPORARY FACILITIES

A. Common-Use Field Office: The Director will provide the location for Contractor provided field office on site. Contractor GCW must furnish a field office, of sufficient size to accommodate needs of Contractor, and to accommodate Project meetings specified in other Division 01 Sections. Provide, furnish, and equip offices as follows:

1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases, as required by Contractor.
2. Drinking water.

B. Storage: The Director will provide an area on site to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Director, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Connect to Director's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Director. At Substantial Completion, restore these facilities to condition existing before initial use. Coordinate connection location with the Director's Representative.

C. Sanitary Facilities: Provide temporary toilets and wash facilities for use of construction personnel. Comply with Director's requirements for type, number, location, operation, and maintenance of fixtures and facilities.

1. Use of Permanent Toilets: Use of Director's existing or new toilet facilities is not permitted.

D. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Electric Power Service: Connect to Director's existing electric power service. Maintain equipment in a condition acceptable to Director.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Connect temporary service to Director's existing power source, as directed by Director's Representative.
   a. Existing Electric Power Service Characteristics: 120-240 volt, ampere, single phase. Provide on site generation for electric power needs in excess of this.
   b. Take measures to avoid overloading existing circuits.
2. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.
   a. Provide 20 ampere duplex outlets, single phase circuits for power tools for every 2000 square feet of active work area.
3. Electric power service shall not be used for welding or space heating.

3.3 SUPPORT FACILITIES INSTALLATION

A. Comply with the following:

1. Maintain support facilities until Director's Representative schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Director.

B. Temporary Use of Permanent Roads and Paved Areas: Maintain existing roads and paved areas during construction operations.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment.

D. Parking: Use existing parking areas designated by Director's Representative for construction personnel.

E. Storage and Staging: Use areas as directed by Director's Representative for storage and staging needs.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. <u>Unauthorized signs, by any party, are not permitted</u>.

1. Identification Signs: Provide Project identification signs:
   a. Graphics to be provided by the Director in coordination with the Architect
      1) Sign may include all contractors' logos, if approved, but shall contain no advertising messages.
   b. Size: 4'x8', fence-mounted, unless otherwise directed by Director.
   c. Material: Coordinated plastic, vinyl banner, or as directed by Director.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
   a. Provide temporary, directional signs for construction personnel and visitors.
3. Safety Signs: Provide safety signs as required by the Authority having Jurisdiction.
4. Maintain and touch up signs, so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to the project's erosion- and sedimentation-control Drawings.

1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
2. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
3. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

F. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

H. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Director from fumes and noise.

I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Comply with Construction Safeguard provisions of applicable building code.
2. Smoking is prohibited on site.
3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.

4. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Avoid trapping water in finished work document visible signed of mold that may appear during construction.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. 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 SECTION

SECTION 01 51 00

TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 01 50 00 - Temporary Facilities and Controls.

1.2 GENERAL REQUIREMENTS

A. Each Prime Contractor is assigned specific responsibilities for certain temporary utilities used by other Prime Contractors and other entities at the site.

B. The Contractor for General Construction Work is responsible for providing temporary utilities that are not specially assigned otherwise by the Contract Documents.

C. No interruption of Director's utility services will be permitted unless approved in writing by Director. Schedule such interruptions at Director's convenience and to minimize frequency of occurrence.

D. Connections to public utility services shall be arranged for by Contractor providing service and performed to utility company requirements.

1.3 TEMPORARY ELECTRICITY

A. Temporary electric service provided by Electrical Contractor.

B. Cost of Electricity: By Director.

C. Connect to Director's existing power service with Contractor supplied cords and GFI's, coordinate with Director.

1. Do not disrupt Director's need for continuous service.
2. Exercise measures to conserve energy.
3. Electric Service at site is 240-Volt Single-Phase.

D. Provide temporary electric feeder from existing electrical service at location as directed by Director's Representative.

E. Complement existing power service capacity and characteristics as required. Power required above, Director's provided service is responsibility of each Prime Contractor at expense of each Prime Contractor.

F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1. Provide 20 ampere duplex outlets, single phase circuits for power tools for every 2000 sq ft of active work area.

2. Provide 20 ampere, single phase branch circuits for lighting.

G. Comply with the National Electrical Code.

H. Provide all temporary outlets with ground fault circuit interrupter protection.

I. Electric heaters will not be permitted.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Temporary lighting for building construction provided by Electrical Contractor.

B. Provide and maintain lighting for construction operations during the normal working day to achieve a minimum lighting level requirements to be per OSHA specifications for brightness.

1.5 TEMPORARY HEATING

A. Each Prime Contractor shall provide temporary heat to maintain conditions required by their Work.

1. All costs of heat, including temporary equipment and fuel shall be paid for by the Prime Contractor requiring same.
2. Provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control. The use of electric space heaters, gasoline-burning space heaters, open burning type, or unsupervised salamander type heating units is prohibited.
3. Maintain temperature of not less than 50 degrees F, unless otherwise approved by Director's Representative.

1.6 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Director.

B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

C. Connect to existing water source with Contractor supplied hoses and backflow preventers.

1. Exercise measures to conserve water.

D. Water used above Director provided services is responsibility of each Prime Contractor at expense of each Prime Contractor.

E. Plumbing Contractor shall provide temporary water distribution.

1. Extend branch piping with outlets located so water is available, at all points in the work area, using 150 foot hoses with threaded connections.
2. Each Contractor is responsible for providing hoses required for their work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 57 23

TEMPORARY STORMWATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Director's Representative, Construction Manager, and earthwork subcontractor.

1.2 INFORMATIONAL SUBMITTALS

A. Inspection reports.

PART 2 - PRODUCTS

2.1 TEMPORARY STORMWATER POLLUTION CONTROLS

A. Provide temporary stormwater pollution controls as indicated on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with all best management practices, general requirements, performance requirements, reporting requirements, and all other requirements included in the contract documents.

B. Locate stormwater pollution controls in accordance with the drawings.

C. Remove temporary stormwater pollution controls at completion of construction and restore and stabilize areas disturbed during construction.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
4. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
   a. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes or unavailability of required warranty terms.
   b. Substitutions for Convenience: Changes proposed by Contractor or Director that are not required in order to meet other Project requirements but may offer advantage to Contractor or Director.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products. This designation is provided for the Contractor’s information. Significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics are also provided in the Contract Documents. The product has been named to inform the Contractor of the Product used in developing details and coordinating various elements of the design. Basis-of-Design products have properties which affect the way they work in a design. These properties are not always listed explicitly in the requirements. Examples of important properties that might not be listed include, exact dimensions, access points for maintenance, and attachment points. Other Products will be considered as equivalents subject to the requirements. Incorporation of another product may require revision of details for installation or additional coordination, all of which is the responsibility of the Contractor.

1.2 GENERAL SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Comply with requirements specified in Section 01 33 00 “Submittal Procedures”.

1.3 SUBSTITUTION REQUEST SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Submit substitution request on Contractor’s letterhead.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Director and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. Certificates and qualification data, where applicable or requested.
   g. Research reports evidencing compliance with building code in effect for Project.
   h. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time.
   i. Cost information, including a proposal of change, if any, in the Contract Sum.
   j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents.

k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. If necessary, Director’s Representative will request additional information or documentation for evaluation within 10 days of receipt of a request for substitution. Director’s Representative will notify Contractor of acceptance or rejection of proposed substitution within 10 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 Director’s Representative Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Director’s Representative does not issue a decision on use of a proposed substitution within time allocated.

1.4 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.

B. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials.

C. Coordination of Substitutions: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

1.5 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and 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 the Project site.
3. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Director.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Director reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Director’s Representative will make selection.
5. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
7. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements. Comply with requirements in

"Comparable Products" article for consideration of an unnamed manufacturer's product.

8. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, provide the specified or indicated product. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Director's Representative will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Director's Representative may return requests without action, except to record noncompliance with the following requirements:

1. Detailed comparison of significant qualities of proposed product with those named in the specifications. Significant qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements indicated. This may be done by highlighting or circling information on manufacturers, published product data or by a certification of compliance from the manufacturers.
2. Evidence that proposed product provides specified warranty.
3. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
4. Samples, if requested.

2.3 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 10 days prior to time required for preparation and review of related submittals.

1. Conditions: Director's Representative will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Director's Representative 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. Substitution request is fully documented and properly submitted.
   c. Requested substitution will not adversely affect Contractor's construction schedule.
   d. Requested substitution has received necessary approvals of authorities having jurisdiction.
   e. Requested substitution is compatible with other portions of the Work.
   f. Requested substitution has been coordinated with other portions of the Work.
   g. Requested substitution provides specified warranty.

B. Substitutions for Convenience: Director's Representative will consider requests for substitution if received within 15 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Director's Representative .

1. Conditions: Director's Representative will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Director's Representative will return requests without action, except to record noncompliance with these requirements:
   a. Requested substitution offers Director a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Director must assume.
   b. Requested substitution does not require extensive revisions to the Contract Documents.
   c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   d. Substitution request is fully documented and properly submitted.
   e. Requested substitution will not adversely affect Contractor's construction schedule.
   f. Requested substitution has received necessary approvals of authorities having jurisdiction.
   g. Requested substitution is compatible with other portions of the Work.
   h. Requested substitution has been coordinated with other portions of the Work.
   i. Requested substitution provides specified warranty.

PART 3 - EXECUTION

3.1 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.2 STORAGE AND PROTECTION

G. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

H. Store and protect products in accordance with manufacturers' instructions.

I. Store with seals and labels intact and legible.

J. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

K. Provide off-site storage and protection when site does not permit on-site storage or protection.

L. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

M. Prevent contact with material that may cause corrosion, discoloration, or staining.

N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

O. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work. This includes both elements of existing construction which are being altered and elements of the work of this Project which are cut.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.2 INFORMATIONAL SUBMITTALS

A. Cutting and Patching: Submit written request in advance of cutting or alteration which affects:

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Include in request:
   a. Identification of Project.
   b. Location and description of affected work.
   c. Necessity for cutting or alteration.
   d. Description of proposed work and products to be used.
   e. Alternatives to cutting and patching.
   f. Date and time work will be executed.

1.3 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Director's Representative of locations and details of cutting and await directions from Director's Representative before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in

reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. 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 Director's Representative opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.4 PROJECT CONDITIONS

A. Maintain excavations for foundation systems and utility work free of water. Provide, operate, and maintain pumping equipment.

B. Protect site and buildings from puddling or running water.

C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere. This applies to both interior and exterior work.

1.5 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Coordinate space requirements, supports, and installation of work which are indicated diagrammatically on Drawings.

D. Coordinate completion and clean-up of work.

E. After Director occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Director's activities.

PART 2 - PRODUCTS

2.1 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.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Director's Representative for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.

B. Drawings showing existing construction and utilities are based on field observation and existing record documents only.

1. Verify that construction and utility arrangements are as shown.
2. Report discrepancies to Director's Representative before disturbing existing installation.

C. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

D. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

E. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Director that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Director's Representative.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Director's Representative promptly.

B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Director's Representative when deviations from required lines and levels exceed allowable tolerances.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

3.4 FIELD ENGINEERING

A. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

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

3.5 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb, and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Director’s Representative.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with Director's Representative.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. Prior to cutting, review proposed procedures with Director's Representative for approval of recommendation.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations. Minimize width of trenching.

Where feasible, trenching should be performed utilizing ditch witch of similar equipment.

5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.
   c. Where the existing surface is not indicated to be refinished, patch to match the surface finish that existing prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
   d. Refinish existing surfaces as indicated.
   e. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
3. Floors and Walls: Where walls or partitions that are altered to complete work, patch and repair floor and wall surfaces. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
   a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
   b. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Director’s Representative.
   c. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
   d. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Director’s Representative review and request instructions.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF DIRECTOR'S PORTION OF THE WORK

A. Site Access: Provide access to Project site for Director's construction personnel.

1. Refer to Section 01 12 00 "Summary" for other requirements for Director-furnished, Contractor-installed and Director-furnished, Director-installed products.

3.8 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas where cutting and patching are performed. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
   a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate schedule for startup of various equipment and systems.

B. Notify Director’s Representative and Director seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper operation, control sequence, and for conditions which may cause damage.

D. Execute start-up under supervision of Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

E. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve system installation prior to start-up, and to supervise placing equipment or system in operation.

F. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

G. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

H. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Director's personnel two weeks prior to date of final inspection.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Director personnel.

A. Utilize operation and maintenance manual as basis for instruction. Review contents of manual with Director's personnel in detail to explain all aspects of operation and maintenance.

3.11 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped areas.

H. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

I. Comply with manufacturer's written instructions for temperature and relative humidity.

3.12 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Restore permanent facilities used during construction to their specified condition.

D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

3.13 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Use cleaning materials that are non-hazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner or recycle; do not burn or bury, or dispose in water bodies.

3.14 CLOSEOUT PROCEDURES

A. Make submittals that are required in accordance with Division 01 Section “CLOSEOUT PROCEDURES”.

1. Provide copies to Director's Representative and Director.

B. Complete a preliminary inspection to determine items to be listed for completion or correction in Contractor's Notice of Substantial Completion.

C. Notify Director's Representative when work is considered ready for Substantial Completion.

D. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Director's Representative review.

E. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Director-occupied areas.

F. Notify Director's Representative when work is considered finally complete.

G. Complete items of work determined by Director's Representative final inspection.

3.15 MAINTENANCE SERVICE

A. Furnish maintenance services of components indicated in specification sections.

B. Furnish maintenance manuals and schedules for equipment indicated in specification sections.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal off-site of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction.

D. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

E. Non-hazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

F. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

G. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

H. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

I. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition and construction 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 Director that may be uncovered during demolition remain the property of Director.

1. Carefully salvage in a manner to prevent damage and promptly return to Director.

1.3 PERFORMANCE REQUIREMENTS

A. Director requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:

1. Aluminum and plastic beverage containers.
2. Packaging: Salvage or recycle 100 percent of the following uncontaminated packaging materials:
   a. Paper.
   b. Cardboard.
   c. Boxes.
   d. Plastic sheet and film.
   e. Polystyrene packaging.
   f. Wood crates.
   g. Plastic pails.

E. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1. Construction Waste:
   a. Lumber.
   b. Wood sheet materials.
   c. Wood trim.
   d. Metals.
   e. Gypsum board and plaster.
   f. Piping.
   g. Electrical conduit.
   h. Copper Wiring
   i. Electrical devices

F. Methods of trash/waste disposal that are not acceptable are:

1. Burning on the project site.
2. Burying on the project site.
3. Dumping or burying on other property, public or private.
4. Other illegal dumping or burying.
5. Incineration, either on- or off-site.
6. Dumping items in water bodies.

G. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, State and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.4 SUBMITTALS

A. Waste Management Plan: Submit plan within 10 calendar days after receipt of notice to proceed, or prior to any trash or waste removal, whichever occurs sooner. Submit a waste management plan to Director's Representative for Director's review and approval.

B. Waste Management Plan: Include the following information:

1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed.
3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
4. Meetings: At regular job meetings describe methods to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."

B. Waste Management Coordinator: Designate a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Director, and Director's Representative.

D. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

E. Meetings: Discuss trash/waste management goals and issues at project meetings.

F. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by contractor and installers.

1. As a minimum, provide:
   a. Separate area for storage of materials to be reused on-site.
   b. Separate enclosures for each category of recyclable.
   c. Recycling bins at worker lunch area.
2. Provide containers as required.
3. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
4. Locate enclosures out of the way of construction traffic.
5. Provide adequate space for pick-up and delivery and convenience to subcontractors.
6. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
7. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products including site materials such as topsoil, gravel, backfill, etc. in preparation for reuse.

I. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

3.2 RECYCLING CONSTRUCTION WASTE

A. Packaging:

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

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
   a. Comply with requirements in Section 32 93 00 "Plants" for use of clean sawdust as organic mulch.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

3.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled or otherwise reused, remove waste materials from Project site and Director's property and legally dispose of them in a landfill.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

C. Project Record Documents: Submit documents to Director's Representative.

D. Operation and Maintenance Data/Manuals:
   1. For equipment, or component parts of equipment put into service during construction and operated by Director, submit completed documents within ten days after acceptance.
   2. Submit 1 copy of completed documents 15 days prior to final inspection. This copy will be reviewed for compliance and returned after final inspection, with Director's Representative comments. Revise content of all document sets as required prior to final submission.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.
   4. Submit data bound in manuals as described in Part 3 of this Section.

E. Warranties:
   1. For equipment or component parts of equipment put into service during construction with Director's permission, submit documents within ten days after acceptance.
   2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

F. Closeout Documents:
   1. Contractor's Affidavit of Payment of Debts and Claims
   2. Contractor's Affidavit of Release of Leans with:
      a. Consent of Surety to Final Payment
      b. Contractor's release or waiver of liens.
      c. Separate releases or waivers of liens for subcontractors, suppliers, and others with lien rights against property of Director, together with list of those parties.

1.2 SUBSTANTIAL COMPLETION PROCEDURES

A. NYSOPRHP will follow a three-step project close-out procedure, as follows:
   1. Approximately two-weeks before project contract completion: <u>Substantial Completion</u> – project site walk-through, and generation of punch list.

2. Approximately one-week before project contract completion: Final Completion – All major punch list item shall be complete, some small items possibly still allowed to progress. All as-built drawings and O&M Manuals shall be received.
3. Day of project contract completion: Joint Inspection of Physical Completion – project shall be 100% complete and accepted; the project site shall be cleaned up; Contractors, equipment, and materials removed from the site. At this point, application for final payment may be made.
4. One day after contract completion: One-year warranty period begins; if work is not completed or accepted, liquidated damages begin.

B. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

C. Submittals Prior to Substantial Completion: Submit the following a minimum of 7 days prior to requesting inspection for determining date of Substantial Completion.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Director unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, and similar final record information.
3. Submit closeout submittals specified in individual Divisions 02 through 34 agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Divisions 02 through 34 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Director's Representative. Label with manufacturer's name and model number where applicable.
5. Submit test/adjust/balance records.

D. Procedures Prior to Substantial Completion: Complete the following a minimum of 7 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Director of pending insurance changeover requirements.
2. Complete startup and testing of systems and equipment.
3. Perform preventive maintenance on equipment used prior to Substantial Completion.
4. Instruct Director's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
5. Participate with Director in conducting inspection and walkthrough with local emergency responders.
6. Terminate and remove temporary facilities from project site, along with construction tools, and similar elements.
7. Complete final cleaning requirements, including touchup painting.
8. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

E. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 7 days prior to date the work will be completed and ready for final inspection and

tests. On receipt of request, Director's Representative will either proceed with inspection or notify each Prime Contractor of unfulfilled requirements. Director's Representative will prepare the Certificate of Substantial Completion after inspection or will notify each Prime Contractor of items, either on Contractor's list or additional items identified by Director's Representative that must be completed or corrected before certificate will be issued.

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

1.3 FINAL COMPLETION PROCEDURES

A. Substantial Completion:
1. Inspection: Submit a written request for inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for inspection and tests. On receipt of request, Director's Representative will either proceed with inspection or notify each Prime Contractor of unfulfilled requirements. Director's Representative will prepare a final Certificate for Payment after inspection or will notify Director's Representative of construction that must be completed or corrected before certificate will be issued.
2. Provide walk-through with Director's Representative, Construction Manager, and Architect/Engineer. Punch list will be generated.
3. Certified List of Incomplete Items: Submit certified copy of Director's Representative Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Director's Representative. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
4. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Final Completion:
1. Provide walk-through with Director's Representative, Construction Manager, and Architect/Engineer. Revised punch list will be generated.
2. Certified List of Incomplete Items: Submit certified copy of Director's Representative Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Director's Representative. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

C. Joint Inspection of Physical Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if

necessary, areas disturbed by Prime Contractor or other Prime Contractors that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor for each building.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.5 SUBMITTAL OF PROJECT WARRANTIES

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

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Each Prime Contractor shall maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Director.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   3. Field changes of dimension and detail.
   4. Details not on original Contract Drawings.

3.2 OPERATION AND MAINTENANCE DATA, GENERAL

A. For Each Product or System where called for in the technical specification sections: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 OPERATION AND MAINTENANCE DATA, FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish where called for in the technical specification sections:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.4 OPERATION AND MAINTENANCE DATA, FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System where called for in the technical specification sections:

1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed or by label machine.

C. Include color coded wiring diagrams as installed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

L. Include test and balancing reports.

M. Additional Requirements: As specified in individual product specification sections.

3.5 OPERATION AND MAINTENANCE MANUALS

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

B. Provide two hard copies of each, plus electronic copy.

C. Prepare data described above in the form of an instructional manual.

D. Binders: Commercial quality, 8-1/2 x 11 inch, three D-size ring binders with durable plastic covers; 2-inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

E. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

F. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

G. Text: Manufacturer's printed data, or typewritten data on 24-pound paper.

H. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

I. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

J. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Director, Director's Representative, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Test data.
      c. Certificates.

3.6 WARRANTIES

A. Obtain warranties, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Director's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form and contain full information as specified herein.

C. Co-execute submittals when required.

D. Retain warranties until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

F. Manual: Bind in commercial quality 8-1/2 x 11 inch, three D-size ring binders with durable plastic covers. Provide digital PDF file of the same information in addition to the printed binder.

G. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

H. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

I. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

J. Ten months following final contract completion date, execute a walk-through with the Director's Representative. Purpose of the walk-through is to identify any items which appear to be failing or mis-operating and require replacement or repair.

3.7 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project:
      a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, of rubbish, waste material, litter, and other foreign substances.
      b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
      c. Remove tools, construction equipment, machinery, and surplus material from Project site.
      d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
      e. Clean floors in occupied and unoccupied spaces.
      f. Avoid dispersing harmful cleaning materials into lawn and landscape plantings. Damaged lawn or landscape plantings shall be replaced at no cost to NYSOPRHP by the Contractor causing such damage.
      g. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.

h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
i. Remove labels that are not permanent.
j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
k. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

C. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."

3.8 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair of remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
1. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
a. Do not paint over “UL” and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
2. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION

SECTION 01 81 13.01

ENVIRONMENTAL PRODUCT DECLARATION (EPD) REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general requirements and procedures for compliance with requirements of Executive Order No. 22 to reduce the embodied carbon in all new construction or construction projects consisting of adaptive reuse or significant renovations costing over $1 million and using the minimum quantities of certain materials set forth below.

1. Bidders shall be required to submit Environmental Product Declarations (EPDs) when available, that include the amount of embodied carbon in given building materials, along with the quantities of these materials used in the construction project. See Article 2.1 Covered Construction Materials.

2. Specific requirements are also included in other Sections.

1.3 REFERENCE STANDARDS

A. General: Comply with the applicable provisions of the referenced standards except as modified by governing codes and the Contract Documents. Where a recommendation or suggestion occurs in the referenced standards, such recommendation or suggestion shall be considered mandatory. In the event of conflict of referenced standards and this specification or within the standards themselves, the more stringent standard or requirement shall govern.

1.4 ACTION SUBMITTALS

A. General: Submit additional submittals required by other Specification Sections.

B. Environmental Product Declaration (EPD) submittals are in addition to other submittals.

1. If submitted item is identical to that submitted to comply with other requirements, include an additional copy with other submittal as a record copy of compliance with indicated EPD requirements. Mark additional copy "EPD submittal."

2. Submit EPD submittals along with and at the same time as other associated submittals. Review of any specific submittal that must contain EPD information shall not be considered complete until the EPD aspects have been approved.
3. Submit the EPD Material Tracking Form with material quantities and delivery receipts with the Application for Payment in which these materials are being requisitioned.

C. EPD Documentation Submittals: If available, provide current EPDs and material quantities, that include the amount of embodied carbon in each product.

1. Acceptable EPDs are non-expired, Product-specific, Facility or Plant specific, or Supply Chain-specific Type III (Third-Party Reviewed), in adherence with ISO 14025 Environmental labels and declarations, ISO 14044 Environmental management – Life cycle assessment, and ISO 21930 Core rules for environmental product declarations of construction products and services.
2. In the EPD Material Tracking Form, provide the actual quantity/volume/weight of each Covered Construction Material incorporated into this project, whether or not an EPD exists for that particular material/product.
3. If an EPD cannot be provided, provide a statement of the contractor's good faith effort to obtain the EPD.

1.5 INFORMATIONAL SUBMITTALS

A. Project Materials Quantity Data: In the EPD Material Tracking Form, provide statement indicating total quantity of each Covered Construction Material used for Project.

B. EPD Action Plan: Provide preliminary submittals within 30 days of date established for the Notice to Proceed, indicating how the EPD reporting requirements will be met:

1. Provide list of Covered Construction Materials and estimated quantities of each, whether or not an EPD exists for that particular material/product.

C. EPD Progress Reports: Concurrent with each Application for Payment, Contractors shall provide an EPD Material Tracking Form and copies of delivery tickets for each Covered Construction Materials used in the Project to date, whether or not an EPD exists for that particular material/product.

PART 2 - PRODUCTS

2.1 COVERED CONSTRUCTION MATERIALS

Material	Minimum Quantity
Concrete mixes	50 cubic yards or more
Asphalt mixes	16,854 pounds (or 10 cubic yards) or more
Steel – Rebar	20,000 pounds or more
Steel – Hollow Structural Sections	5,000 pounds or more
Steel – Fabricated Steel Plate	5,000 pounds or more
Steel – Hot-Rolled Sections	5,000 pounds or more
Steel – Cold-Formed and Galvanized	5,000 pounds or more
Glass – Flat Glass	2,000 square feet or more
Glass – Processed Glass	2,000 square feet or more
Glass – Insulated Glazing Units	2,000 square feet or more

PART 3 - EXECUTION

3.1 ATTACHMENTS

A. Environmental Product Declarations (EPDs).
   1. The attached is an example of an EPD that includes the amount of embodied carbon in the product.

END OF SECTION

Hanson Aggregates, New York
Environmental Product Declaration
Mix 5007047 - Rochester

This cradle to gate Environmental Product Declaration (EPD) reports the impacts for one cubic yard of ready-mixed concrete, meeting the following product specifications:

ACI 211: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
ACI 318: Building Code Requirements for Structural Concrete.
ASTM C94 Standard Specification for Ready-Mixed Concrete.
CSI Masterformat Division 03-30-00: Cast-in-Place Concrete.
UNSPSC Code 30111500: Ready Mix

COMPANY

Hanson Aggregates, New York
5125 NY-28,
Middleville, NY 13406

PLANT

Rochester
1535 Scottsville Road Rochester, NY 14623

PROGRAM OPERATOR

ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428

DATE OF ISSUE

9/28/2021

PERIOD OF VALIDITY

August 4th, 2026

Environmental Impacts

Declared Product:

5007047 - Rochester

Compressive Strength: 4000 psi at 28 days

Declared Unit:

1 yd3 of ready-mix concrete		yd^3	m^3
Global Warming Potential	kg CO2e	234.67	306.95
Ozone Depletion	kg CFC11e	7.16E-06	9.36E-06
Acidification	kg SO2e	0.64	0.83
Eutrophication	kg Ne	0.27	0.35
SFP (Smog)	kg O3e	12.15	15.89
Abiotic depletion potential for fossil resources	MJ, NCV	473.16	618.89
Abiotic depletion potential for non-fossil mineral resources	kg Sbe	1.52E-04	1.99E-04

Product Components:

natural aggregate (ASTM C33), portland limestone cement (ASTM 595), batch water (ASTM C1602), admixture (ASTM C494), admixture (ASTM C260)

ISO 21930:2017 Sustainability in Building Construction-Environmental Declaration of Building Products: serves as the core PCR for Concrete; NSF International, February 2019 serves as a subcategory PCR

Sub-category PCR review was conducted by

Thomas P. Gloria, PhD. (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants

Independent verification of the declaration and data, according to ISO 21930:2017 and ISO 14025:2006.: ☐ internal ☑ external

Third party verifier: Thomas P. Gloria, PhD. (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants

For additional explanatory material:

Manufacture Representative: **Craig Green** (Craig.Green@LehighHanson.com)

LCA and EPD Developer: **Athena Sustainable Materials Institute**

Disclaimer: EPDS are comparable only if they comply with this document, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

Cement accounts for as much as 95% of the impacts of the concrete mixes included in this EPD and thus manufacturer specific cement impacts could result in variation of as much as 47.5%

DECLARED UNIT

The declared unit is 1 cubic yard of ready mixed concrete product. Key product variables include:

- Compressive strength - Compressive strengths are represented in the various mix designs and include the number of days after pouring as a part of the reference value: e.g. 3,000 psi @ 28 days; 4,000 psi @ 56 days; 6,000 psi @ 90 days; etc.
- Water to cementitious materials ratio (w/cm) – Varies but generally lower for higher strength non-air entrained mix designs (above 5,000 psi (34.5 MPa)) in accordance with ACI 211.1 recommendations.
- SCM use – various mix designs call for Portland cement displacement by incorporating fly ash (FA) and/or slag cement (SL).
- Admixtures use – Admixtures used was specified for the different mixes that were modeled. These admixtures included an air-entraining admixture, water reducing and accelerating admixtures, and high range water reducer admixtures
- The ready mixed concrete products represented in this EPD are comprised of (in order of greatest mass per mix): natural and crushed aggregates, portland or portland limestone cement, slag cement, batch water, and admixtures.

SYSTEM BOUNDARY

A summary of life cycle stages included in the EPD is identified in the figure below. This EPD covers A1-A3 life cycle stages (Cradle-to-Gate). A summary of activities excluded from the EPD is as follows:

- Production, manufacture, and construction of manufacturing capital goods and infrastructure.
- Production and manufacture of production equipment, delivery vehicles, and laboratory equipment.
- Personnel-related activities (travel, furniture, and office supplies)
- Energy and water se related to company management and sales activities.

BUILDING LIFE CYCLE INFORMATION MODULES (X: Included in LCA; MND: Module Not Declared)

Production State			Construction Stage		Use Stage							End-Of-Life Stage			
Extraction Production	Transport to Facility	Manufacturing	Transport to Site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational	Operational	De-Construction	Transport to Disposal	Waste Processing	Disposal of Waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

CUT-OFF RULES

The cut-off criteria for all activity stage flows considered within the system boundary conform with ISO 21930: 2017 Section 7.1.8. Specifically, the cut-off criteria were applied as follows:

- All inputs and outputs for which data are available are included in the calculated effects and no collected core process data are excluded.
- A one percent cut-off is considered for renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process. The sum of the total neglected flows does not exceed 5% of all energy consumption and mass of inputs.
- All flows known to contribute a significant impact or to uncertainty (e.g., portland cement and admixtures) are included.
- The cut-off rules are not applied to hazardous and toxic material flows – all of which are included in the life cycle inventory.
- Proxy data was used for admixtures used that did not align with any of the admixture categories published in the EFCA EPDs. In those cases, the Water Reducing Admixture data was selected as a conservative assumption as per the NSF PCR Appendix A.

ALLOCATION

The allocation of co-products or secondary flows cross the system boundary conforms with the ISO 21930: 2017 Section 7.2.4. Specifically, the allocation criteria were applied as follows:

- Allocation was not applied to any of the gate-to-gate production facilities. For facilities that manufacture additional products (i.e. aggregate), the LCI flows at the facility specific to the concrete production were reported.
- For Secondary Data sources, the NSF PCR default allocation selection (i.e. “Cut-off” or “Alloc Rec”) was applied.
- The product category rules for this EPD recognize fly ash, silica fume and slag as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a concrete material input.
- A portion (30%) of the reported fleet energy use for truck mixing plants was allocated to the mixing facility.

CALCULATED RESULTS A1-A3

Core Mandatory Impact Indicator		**per yd^3**	**per m^3**
Global warming potential	kg CO2e	234.67	306.95
Depletion potential of the stratospheric ozone layer	kg CFC11e	7.16E-06	9.36E-06
Acidification potential of soil and water sources	kg SO2e	0.64	0.83
Eutrophication potential	kg Ne	0.27	0.35
Formation potential of tropospheric ozone	kg O3e	12.15	15.89
Abiotic depletion potential for fossil resources	MJ, NCV	473.16	618.89
Abiotic depletion potential for non-fossil mineral resources	kg Sbe	1.52E-04	1.99E-04
Fossil fuel depletion	MJ Surplus	55.66	72.80
Use of Primary Resources			
Renewable primary energy carrier used as energy	MJ, NCV	49.55	64.81
Renewable primary energy carrier used as material	MJ, NCV	0.06	0.08
Non-renewable primary energy carrier used as energy	MJ, NCV	581.45	760.53
Non-renewable primary energy carrier used as material	MJ, NCV	0.00	0.00
Secondary Material, Secondary Fuel and Recovered Energy			
Secondary material	kg	26.21	34.28
Renewable secondary fuel	MJ, NCV	12.00	15.70
Non-renewable secondary fuel	MJ, NCV	115.86	151.54
Recovered energy	MJ, NCV	0.00	0.00
Mandatory Inventory Parameters			
Consumption of freshwater resources	m3	1.92	2.52
Calcination and carbonation emissions	kg CO2e	0.00	0.00
Indicators Describing Waste			
Hazardous waste disposed	kg	0.00	0.00
Non-hazardous waste disposed	kg	68.34	89.39
High-level radioactive waste, conditioned, to final repository	m3	8.76E-08	1.15E-07
Intermediate- and low-level radioactive waste, to final repository	m3	4.19E-07	5.48E-07
Components for re-use	kg	0.00	0.00
Materials for recycling	kg	0.12	0.15
Materials for energy recovery	kg	0.00	0.00
Recovered energy exported from the product system	MJ, NCV	0.43	0.56

DATA SOURCES

Portland Cement and Limestone Cement, ASTM C595, AASHTO M240, or CSA A3001	Portland Limestone Cement 1 - Lehigh Cement, Picton, Ontario (PCA Avg EPD)	2021	North America	Technology: very good, Time: very good, Geography: very good, Completeness: very good, Reliability: very good
Slag Cement, ASTM C989	Slag Cement Association EPD of North America Slag Cement (2021)	2021	North America	Technology: very good, Time: very good, Geography: very good, Completeness: very good, Reliability: very good
Fly Ash, ASTM C618	None, no incoming burden, only inbound transport is considered*	N/A	N/A	N/A
Silica Fume, ASTM C1240	None, no incoming burden, only inbound transport is considered*	N/A	N/A	N/A
Crushed Aggregates, coarse and fine, ASTM C33	ecoinvent 3.4: "Gravel, crushed {RoW}| production | Cut-off, U" (2018), modified with US average electricity	2001	World/US	Technology: very good, Time: poor, Geography: good, Completeness: very good, Reliability: very good
Natural Aggregates, coarse and fine, ASTM C33	ecoinvent 3.4: "Gravel, round {RoW}| gravel and sand quarry operation | Cut-off, U" (2018), modified with US average electricity	2001	World/US	Technology: very good, Time: poor, Geography: good, Completeness: very good, Reliability: very good
Manufactured Lightweight Aggre- gates, ASTM C330	ecoinvent 3.4: Expanded clay {RoW}| production | Cut-off, U (2018), modified with US average electricity	2000	World/US	Technology: good, Time: poor, Geography: good, Completeness: very good, Reliability: very good
Admixtures, ASTM C494	GCP Applied Technologies LCA for Concrete Admixtures (2020)	2020	North America	Technology: very good, Time: very good, Geography: fair, Completeness: very good, Reliability: very good
Steel Fibers	CRSI EPD for Fabricated Steel Reinforcement (2017)	2017	North America	Technology: very good, Time: very good, Geography: fair, Completeness: very good, Reliability: very good
Synthetic Fibers	USLCI 2014: Polypropylene resin, at plant/RNA	2014	North America	Technology: very good, Time: very good, Geography: fair, Completeness: very good, Reliability: very good
Batch and Wash Water, ASTM C1602	ecoinvent 3.4: Tap water {RoW}| market for | Cut-off, U (2018), modified with US average electricity	2011	World/US	Technology: very good, Time: good, Geography: good, Completeness: very good, Reliability: very good
Road Transport	USLCI 2014: Transport, combination truck, short-haul, diesel powered/tkm/RNA (2014)	2010	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Rail Transport	USLCI 2014: Transport, train, diesel powered /US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Ocean Transport	USLCI 2014: Transport, ocean freighter, average fuel mix/US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Electricity	ecoinvent 3.4: Electricity, low voltage {XX}| market for | Cut-off, U (2018)	2015	North America	Technology: very good, Time: very good, Geography: very good, Completeness: very good, Reliability: very good
Diesel	USLCI 2014: Diesel, combusted in industrial boiler / US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Gasoline	USLCI 2014: Gasoline, combusted in equipment /US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Liquefied Propane Gas	USLCI 2014: Liquefied petroleum gas, combusted in industrial boiler /US U (2014)	2007	North America	Technology: very good, Time: fair, Geography: very good, Completeness: very good, Reliability: very good
Hazardous Solid Waste	ecoinvent 3.4: Hazardous waste, for incineration {RoW}| treatment of hazardous waste, hazardous waste incineration | Alloc, Rec, U (2018), modified with US electricity	2011	World/US	Technology: very good, Time: good, Geography: good, Completeness: very good, Reliability: very good
Non-Hazardous Solid Waste	ecoinvent 3.4: Inert waste {RoW}| treatment of, sanitary landfill | Alloc Rec, U (2018), modified with US average electricity	2011	World/US	Technology: very good, Time: good, Geography: good, Completeness: very good, Reliability: very good

REFERENCES

American Concrete Institute (2009) ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

American Concrete Institute (2009) ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete

American Concrete Institute (2008) ACI 318: Building Code Requirements for Structural Concrete.

ASTM International (2018) ASTM C94: Standard Specification for Ready-Mixed Concrete.

ASTM International General Program Instructions (2020) v8.0

Bare, J. (2012) Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI) v2.1.

Construction Specifications Institute (CSI) MasterFormat Division 03-30-00 Cast-in-Place Concrete

CSA Group (2014) CSA A23.1-09/A23.2-14 - Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.

EN 15804:2012 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

European Federation of Concrete Admixture Associations (2015). EFCA Environmental Declarations for Admixtures.

ISO 14040 Environmental Management - Life cycle assessment - Principles and framework

ISO 14044:2006/AMD 1:2017/ AMD 2:2020 Environmental Management - Life Cycle Assessment - Requirements and Guidelines

International Organization for Standardization (2017) ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.

National Renewable Energy Laboratory (2019) U.S. Life Cycle Inventory Database http://www.nrel.gov/lci/

NSF International (2019) Product Category Rule for Concrete, Version 1

Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., & Weidema, B. (2016) The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, 21, 1218–1230.

SECTION 01 91 13

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for Commissioning Authority responsibilities.
2. Section 013300 "Submittal Procedures" for submittal procedure requirements for commissioning process.
3. Section 017700 "Closeout Procedures" for Certificate of Construction-Phase Commissioning Process Completion submittal requirements.
4. Section 019119.43 "Exterior Enclosure Commissioning" for technical commissioning requirements for exterior closure.
5. Division 26 for technical commissioning requirements for electrical systems.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1.2 INFORMATIONAL SUBMITTALS

A. Comply with requirements in Section 013300 "Submittal Procedures" for submittal procedure general requirements for commissioning process.

B. Commissioning Plan Information:

1. List of Contractor-appointed commissioning team members to include specific personnel and subcontractors performing the various commissioning requirements.
2. Schedule of commissioning activities, integrated with the Construction Schedule. Comply with requirements in Section 013200 "Construction Progress Documentation" for the Construction Schedule general requirements for commissioning process.
3. Contractor personnel and subcontractors participating in each test.
4. List of instrumentation required for each test to include identification of parties that will provide instrumentation for each test.

C. Commissioning schedule.

D. List test instrumentation, equipment, and monitoring devices. Include the following information:

1. Make, model, serial number, and application for each instrument, equipment, and monitoring device.
2. Brief description of intended use.
3. Calibration record showing the following:

a. Calibration agency, including name and contact information.
b. Last date of calibration.
c. Range of values for which calibration is valid.
d. Certification of accuracy.
e. Certification for calibration equipment traceable to NIST.
f. Due date of the next calibration.

E. Test Reports:

1. Pre-Startup Report: Prior to startup of equipment or a system, submit signed, completed construction checklists.
2. Test Data Reports: At the end of each day in which tests are conducted, submit test data for tests performed.
3. Commissioning Issue Reports: Daily, at the end of each day in which tests are conducted, submit commissioning issue reports for tests for which acceptable results were not achieved.

F. Construction Checklists:

1. Material checks.
2. Installation checks.
3. Startup procedures, where required.

1.3 CLOSEOUT SUBMITTALS

A. Commissioning Report:

1. At Construction-Phase Commissioning Completion, include the following:
   a. Approved test procedures.
   b. Test data forms, completed and signed.
   c. Commissioning issue report log.
   d. Commissioning issue reports showing resolution of issues.
   e. Correspondence or other documents related to resolution of issues.
   f. Other reports required by commissioning process.
   g. List unresolved issues and reasons they remain unresolved and should be exempted from the requirements for Construction-Phase Commissioning Completion.
   h. Report shall include commissioning work of Contractor.

B. Request for Certificate of Construction-Phase Commissioning Process Completion.

C. Operation and Maintenance Data: For proprietary test equipment, instrumentation, and tools to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Commissioning Coordinator Qualifications:

1. Documented experience commissioning systems of similar complexity to those contained in these documents on at least **three** projects of similar scope and complexity.
2. Certification of commissioning-process expertise. The following certifications are acceptable. Owner reserves the right to accept or reject certifications as evidence of qualification.

    a. Certified Commissioning Authority, by AABC Commissioning Group (ACG).
    b. Commissioning-Process Management Professional, by American Society of Heating, Refrigerating and Air-Conditioning Engineers.
    c. Certified Commissioning Professional, by Building Commissioning Association.
    d. Accredited Commissioning-Process Authority Professional, by University of Wisconsin.
    e. Accredited Commissioning-Process Manager, by University of Wisconsin.
    f. Accredited Green Commissioning-Process Provider, by University of Wisconsin.

PART 2 - PRODUCTS
PART 3 - EXECUTION

END OF SECTION

SECTION 01 91 19.43

EXTERIOR ENCLOSURE COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes building enclosure requirements for the above- and below-grade systems and assemblies:

1. Opaque walls.
2. Roofs.
3. Openings.
4. Interfaces.

1.2 DEFINITIONS

A. Building Enclosure: Materials, components, systems, and assemblies intended to provide shelter and environmental separation between interior and exterior, or between two or more environmentally distinct interior spaces in a building or structure. The building enclosure includes, but is not limited to, exterior walls, above and below grade, and roof assemblies.

B. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

C. Water Penetration: Visible evidence of uncontrolled water penetration on or adjacent to the test specimen in a location not intended to collect and drain water to the building exterior.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Construction Checklists: Provide “Preliminary Commissioning Report” per NYSECCC section C408.2.4.

C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For building envelope systems and components to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 BUILDING ENCLOSURE TESTING

A. Building Enclosure Testing: Perform testing before installation of interior finishes unless otherwise indicated.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Building Enclosure Testing: Perform the following tests in the following order:

1. Whole Building Air Leakage Rate by Fan Pressurization: ASTM E779.

    a. Maximum Air Leakage Rate: 0.35 cubic feet per minute per square foot (cfm/ft2) at a pressure differential of 75pa

2. Whole Building Air Tightness Using an Orifice Blower Door: ASTM E1827.

    a. Provide only if ASTM E779 is not possible or applicable. Submit a written explanation for the proposed alternative.
    b. Maximum Air Leakage Rate: 0.35 cubic feet per minute per square foot (cfm/ft2) at a pressure differential of 75pa.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 DEFINITIONS

A. Form-Facing Material: The temporary form materials that come in direct contact with the concrete as part of the formwork components in supporting the concrete while the concrete is setting and gaining sufficient strength to be self-supporting. The most common materials are steel, aluminum, and wood.

B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. As-Cast Surface Form-Facing Material:

1. Provide continuous, true, and smooth concrete surfaces.
2. Furnish in largest practicable sizes to minimize number of joints.
3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-in-Place Concrete, and as follows:

   a. Plywood, metal, or other approved panel materials.

B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

1. Provide lumber dressed on at least two edges and one side for tight fit.

C. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

2.2 RELATED MATERIALS

A. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

B. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
2. Form release agent for form liners to be acceptable to form liner manufacturer.

C. Form Ties: Factory-fabricated, removable or snap-off, 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 leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

D. Sealant: One-part moisture cure silicone sealant used with form liners.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

A. Comply with ACI 301.

B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-in-Place Concrete" for as-cast finishes .

C. Construct forms tight enough to prevent loss of concrete mortar.

1. Minimize joints.
2. Exposed Concrete: Symmetrically align joints in forms.

D. Construct removable forms for easy removal without hammering or prying against concrete surfaces.

1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
3. Install keyways, reglets, recesses, and other accessories, for easy removal.

E. 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.

1. Provide and secure units to support screed strips
2. Use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.

1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
2. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

1. Determine sizes and locations from trades providing such items.
2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.

K. Construction and Movement Joints:

1. Construct joints true to line with faces perpendicular to surface plane of concrete.
2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
3. Place joints perpendicular to main reinforcement.
4. Locate joints for slabs in the middle third of spans.
5. Locate horizontal joints in walls and at underside of floors, slabs, and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings.

a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

L. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.

1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

M. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

N. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

O. Coat contact surfaces of forms with form-release agent, in accordance with manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF 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.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
3. Clean embedded items immediately prior to concrete placement.

3.3 REMOVING AND REUSING FORMS

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

1. 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.

1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
2. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.

1. Align and secure joints to avoid offsets.
2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 INSTALLATION OF SHORING AND RESHORING

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.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Director's Representative will engage a special inspector to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Inspections:

1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.

D. Prepare test and inspection reports.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of Architect.

1.2 QUALITY ASSURANCE

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

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement.

1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

B. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

B. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.

1. Finish: Plain.

C. Provide stainless steel or plastic components for placement within 1-1/2 inches of weathering surfaces.

2.3 FABRICATING REINFORCEMENT

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

B. Welding of reinforcement is permitted only within the specific approval of Architect/Engineer. Perform welding in accordance with AWS D1.4/D1.4M.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. 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 reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

   a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches.

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement.
2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

A. Special Inspections and Testing: Director's Representative will engage a qualified Special Inspector and Testing Agency to perform tests and special inspection, and to prepare test reports for foundation reinforcing steel identified as Special Inspection for the project. Refer to Special Inspections Section 01 41 00 - "Special Inspections and Structural Testing for Statement of Special Inspections." Special Inspections are the responsibility of the Director. All other quality control testing is the responsibility of the General Contractor.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DEFINITIONS

A. Cementitious Materials: Portland cement or blended hydraulic cement alone or in combination with one or more of the following:

1. Fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cementitious Materials (w/cm) Ratio: The ratio by weight of mixing water to cementitious materials.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Portland cement.
2. Blended hydraulic cement.
3. Fly ash.
4. Aggregates.
5. Admixtures:

   a. Include limitations of use. Admixtures that do not comply with reference ASTM International requirements must be submitted with test data for approval.
6. Vapor retarders.
7. Liquid floor treatments.
8. Curing materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Compressive strength at 28 days or other age as specified.
3. Compressive strength required at stages of construction.
4. Durability exposure classes for Exposure Categories F, S, W, and C.
5. Maximum w/cm ratio.
6. Slump or slump flow limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Intended placement method.
10. Submit adjustments to design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant changes.

C. Environmental Product Declarations: Provide current Environmental Product Declarations (EPDs), that include the amount of embodied carbon in each concrete mix and each concrete product (including masonry units, veneer, etc.) submittal for use on the project.

1. Acceptable EPDs are non-expired, Product-specific, Facility or Plant-specific, or Supply Chain specific Type III (Third Party Reviewed), in adherence with ISO 14025 Environmental labels and declarations, ISO 14044 Environmental management - Life cycle assessment, and ISO 21930 Core rules for environmental product declarations of construction products and services.
2. Provide the EPD Material Tracking Form containing the total anticipated quantity/volume/weight (matching the units used in the EPDs) of each product being incorporated into the project.

    a. With each application for payment, provide an updated EPD Material Tracking Form and copies of delivery tickets for each product incorporated into the project for the period covered by the payment application.

D. Clean Concrete Certification or Exemption: Certify that all concrete mixed utilized on the project have a Global Warming Potential (GWP) below the maximum limit (See Section 01 81 13.01. Article 2.2 Global Warming Potential Limits) or obtain an exemption from OPRHP.

1. Provide the Clean Concrete Certification and Exemption Form containing a list of all concrete mixes incorporated into the project. Indicate whether a mix meets the minimum standards set forth in the NYS Buy Clean Concrete Guidelines, which include and acceptable EPD with GWP below the maximum limit. If a mix does not meet the minimum standards, describe reason for the exemption request and any methods that will be used to reduce concrete GWP on the project.
2. Provide the Clean Concrete Certification and Exemption Form containing a list of all concrete mixes incorporated into the project. Indicate whether a mix meets the minimum standards set forth in the NYS Buy Clean Concrete Guidelines, which include an acceptable EPD with GWP below the maximum limit. If a mix does not meet the minimum standards, describe a reason for the exemption request and any methods that will be used to reduce concrete GWP on the project.

    a. For each concrete mix listed, attached an acceptable EPD or, if an acceptable EPD is not available, provide details of the mix composition.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified Installer who employs Project personnel qualified as an ACI-certified Concrete Flatwork Associate and Concrete Flatwork Finisher and a supervisor who is a certified ACI Advanced Concrete Flatwork Finisher/Technician or an ACI Concrete Flatwork Finisher with experience installing and finishing concrete.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.5 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 as follows:

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When air temperature has fallen to, or is expected to fall below 40 deg F during the protection period, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
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

2.1 CONCRETE STANDARDS

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I or Type II.
2. Blended Hydraulic Cement: ASTM C595/C595M, Type IL, portland-limestone cement.

C. Normal-Weight Aggregates:

1. Coarse Aggregate: ASTM C33/C33M
2. Fine Aggregate: ASTM C33/C33M.
3. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
4. Alkali-Silica Reaction: Comply with one of the following for each aggregate used:

a. Expansion Result of Aggregate: Not more than 0.04 percent at one year when tested in accordance with ASTM C1293.
b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not

more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567. Do not use this option with fly ash with an alkali content greater than 4.0 percent. Submit supporting data for each aggregate showing expansion in excess of 0.10 percent when tested in accordance with ASTM C1260.

c. Alkali Content in Concrete: Not to exceed 4 lb./cu. yd. for aggregate with expansion greater than or equal to 0.04 percent and less than 0.12 percent or 3 lb./cu. yd. for aggregate with expansion greater than or equal to 0.12 percent and less than 0.24 percent. Test aggregate reactivity in accordance with ASTM C1293. Calculate alkali content of concrete in accordance with ACI 301. Do not use this option with natural pozzolan or fly ash that has a calcium oxide content greater than 18 percent or an alkali content greater than 4.0 percent; or for an aggregate with expansion at one year greater than or equal to 0.24 percent when tested in accordance with ASTM C1293.

2.3 ADMIXTURES

A. Air-Entraining Admixture: ASTM C260/C260M.

B. Chemical Admixtures: Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.

C. Mixing Water for Concrete Mixtures and Water Used to Make Ice: ASTM C1602/C1602M. Include documentation of compliance with limits for alkalis, sulfates, chlorides, or solids content of mixing water from Table 2 in ASTM C1602/C1602M.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F (10 deg C): Black.
b. Ambient Temperature between 50 and 85 deg F (10 and 29 deg C): Any color.
c. Ambient Temperature Above 85 deg F (29 deg C): White.

C. Water: Potable water that does not cause staining of the surface.

2.5 ACCESSORIES

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

2.6 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.7 CONCRETE MIXTURE MATERIALS

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, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland or hydraulic cement in concrete assigned to Exposure Class F3 as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.8 CONCRETE MIXTURE CLASS TYPES

A. Class B: Normal-weight concrete used for exterior slabs, footings, and foundation walls.

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum w/cm Ratio: 0.45.
3. Slump Limit: 5 inches, plus or minus 1.5 inches for concrete.
4. Air Content:
   a. Exposure Classes F2 and F3: 6.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.

B. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum w/cm Ratio: 0.45.
3. Slump Limit: 4 inches, plus or minus 1 inch for concrete.
4. Air Content:

   a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and furnish delivery ticket.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.

4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 TOLERANCES

A. Comply with ACI 117.

3.4 INSTALLATION OF 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.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.5 INSTALLATION OF VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap joints 6 inches and seal with manufacturer's recommended tape.
4. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
5. Protect vapor retarder during placement of reinforcement and concrete.

a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides and sealing to vapor retarder.

3.6 INSTALLATION OF CAST-IN-PLACE CONCRETE

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Water addition in transit or at the Project site must be in accordance with ASTM C94/C94M and must not exceed the permitted amount indicated on the concrete delivery ticket.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. 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. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 INSTALLATION OF JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.

    a. Continue reinforcement across construction joints unless otherwise indicated.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete

into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: 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. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

3.8 APPLICATION OF FINISHING FLOORS AND SLABS

A. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.

B. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface. Use of an approved finishing aid is acceptable.

5. Do not apply troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

    a. Slabs on Ground:
        1) Specified overall values of flatness, FF 35; and of levelness, FL 25; with minimum local values of flatness, FF 24; and of levelness, FL 17.

C. Trowel and Fine-Broom Finish: First apply a trowel finish to surfaces indicated on Drawings. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with a fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

3.9 APPLICATION OF FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 (ACI 301M) Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

    a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
    b. Remove projections larger than 1 inch.
    c. Tie holes do not require patching.
    d. Surface Tolerance: ACI 117, Class D.
    e. Apply to concrete surfaces for metal lap pan deck formed surfaces and those surfaces that are buried or covered with subsequent installed surfaces.

2. ACI 301 (ACI 301M) Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

    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: ACI 117, Class B.
    e. Locations: Apply to concrete surfaces exposed to public view,.

B. Rubbed Finish: Apply the following to as-cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:

    a. Perform no later than one day after form removal.
    b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
    c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.

3.10 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling in:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to match color and texture with in-place construction exposed to view.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
4. Prior to pouring concrete, place and secure anchorage devices.

    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.11 APPLICATION OF CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305R, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.

2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period as follows:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

        1) Recoat areas subject to heavy rainfall within three hours after initial application.
        2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing after finishing concrete.
2. Interior Concrete Floors:

    a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

        1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

            a) Lap edges and ends of absorptive cover not less than 12 inches.
            b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

        2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

            a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
            b) Cure for not less than seven days.

        3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following not in cold weather:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

c. Floors To Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

d. Floors To Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain

continuity of coating, and repair damage during curing period.

3.12 INSTALLATION OF JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s).

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.13 INSTALLATION OF CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to meet specification requirements.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks in excess of 0.01 inch spalls, air bubbles exceeding surface finish limits, honeycombs, rock pockets, fins and other projections on the surface exceeding surface finish limits, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.

a. Limit cut depth to 3/4 inch.
b. Make edges of cuts perpendicular to concrete surface.
c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
d. Fill and compact with patching mortar before bonding agent has dried.
e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
b. Compact mortar in place and match surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance, as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

   a. Correct low and high areas.
   b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including 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.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by adding patching mortar.

   a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

   a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
   b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

   a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
   b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.

   a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
   b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
   c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
   d. Place, compact, and finish to blend with adjacent finished concrete.
   e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

    a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
    b. Dampen cleaned concrete surfaces and apply bonding agent.
    c. Place patching mortar before bonding agent has dried.
    d. Compact patching mortar and finish to match adjacent concrete.
    e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Special Inspections: Director's Representative will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency to be responsible for providing curing facility for initial curing of strength test specimens on-site and verifying that test specimens are cured in accordance with standard curing requirements in ASTM C31/C31M.
2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

    a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

        1) Project name.
        2) Name of testing agency.
        3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
        4) Name of concrete manufacturer.
        5) Date and time of inspection, sampling, and field testing.
        6) Date and time of concrete placement.
        7) Location in Work of concrete represented by samples.
        8) Date and time sample was obtained.
        9) Truck and batch ticket numbers.
        10) Design compressive strength at 28 days.
        11) Concrete mixture designation, proportions, and materials.
        12) Field test results of fresh concrete, including slump or slump flow, air content, temperature and density.

13) Information on storage and curing of samples at the Project site, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

4. Provide a space and source of power or other resources for curing and access to test specimens by the testing agency.

C. Delivery Tickets: comply with ASTM C94/C94M.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 150 cu. yd. or fraction thereof.

   a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing is to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

   a. One test at point of delivery for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests as needed.

3. Slump Flow: ASTM C1611/C1611M:

   a. One test at point of delivery for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests as needed.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; .

   a. One test for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

    a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample when strength test specimens are cast.

6. Concrete Density: ASTM C138/C138M:

    a. One test for each composite sample when strength test specimens are cast.

7. Compression Test Specimens: ASTM C31/C31M:

    a. Cast and standard cure two sets of two 6 inches by 12-inches or 4-inch by 8-inch cylindrical specimens for each composite sample.
    b. Cast, and field cure two sets of two standard cylindrical specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C39/C39M.

    a. Test one set of two standard cured specimens at seven days and one set of two specimens at 28 days.
    b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
    c. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests of standard cured cylinders equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:

    a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. 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.

        1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.7.6.3.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.15 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using floor slab protective covering.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

D. SBX: An inorganic boron used to prevent termites and fungal decay.

E. Lumber grading agencies, and 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. WWPA: Western Wood Products Association.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.3 INFORMATIONAL SUBMITTALS

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

1. Wood-preservative-treated wood.

2. Engineered wood products.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

1.4 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber 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.
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 wood products.
4. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 15 percent.
2. Dimension Lumber: [19 percent] for 2-inch nominal thickness unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. 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.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Wood-Preservative-Treated Lumber by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with 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, chemical formulations are not to require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
3. After treatment, redry boards dimension lumber to 19 percent maximum moisture content.

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, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED LUMBER

A. General: Where fire-retardant-treated materials are indicated, materials are to comply 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 in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 ft. beyond the centerline of the burners at any time during the test.

1. Treatment is not to promote corrosion of metal fasteners.
2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials are to have a moisture content of 28 percent or less

when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency and other information required by authorities having jurisdiction.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:

1. Concealed blocking.
2. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
3. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions by Grade:

1. Grade: Construction, Stud, or No. 3.
2. Application: Interior partitions not indicated as load bearing.
3. Species:
   a. Spruce-pine-fir; NLGA.
   b. Northern species; NLGA.

B. Load-Bearing Partitions by Grade:

1. Grade: Refer to drawings .
2. Application: Exterior walls and interior load-bearing partitions.
3. Species:
   a. Refer to drawings

C. Rafters and Other Framing by Grade:

1. As indicated on the drawings.

D. Exposed Framing: Hand-select material indicated to receive a stained or natural finish for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Species and Grade:

   a. As indicated above for load-bearing construction of same type.

2.5 ENGINEERED WOOD PRODUCTS

A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Boise Cascade.
   b. Louisiana-Pacific Corporation.
   c. Weyerhaeuser Company.

2. Extreme Fiber Stress in Bending, as indicated on drawings.
3. Modulus of Elasticity, as indicated on drawings.

C. Moisture Protection:

1. For western species (Douglas fir/hemlock), factory end and edge seal laminated veneer lumber with opaque moisture barrier.
2. For southern and eastern species (southern yellow pine, yellow poplar), factory seal laminated veneer lumber on face, edge, and ends.

2.6 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. Dimension Lumber Items:

1. Grade: Construction or No. 2.
2. Species: Any of the following species:

   a. Hem-fir (north); NLGA.
   b. Mixed southern pine or southern pine; SPIB.
   c. Spruce-pine-fir; NLGA.
   d. Hem-fir; WCLIB or WWPA.

e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
f. Western woods; WCLIB or WWPA.
g. Northern species; NLGA.
h. Eastern softwoods; NeLMA.

C. Utility Shelving:

1. Lumber Moisture Content: 15 percent maximum.
2. Species and Grade:

a. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.
b. Mixed southern pine or southern pine; No. 2 grade; SPIB.
c. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
d. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

D. Concealed Boards:

1. Lumber Moisture Content: 15 percent maximum.
2. Species and Grade: Any of the following:

a. Mixed southern pine or southern pine; No. 2 grade; SPIB.
b. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
c. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
d. Eastern softwoods; No. 2 Common grade; NeLMA.
e. Northern species; No. 2 Common grade; NLGA.
f. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

E. Roofing Nailers: Structural- or No. 2-grade lumber or better; kiln-dried Douglas fir, southern pine, or wood having similar decay-resistant properties.

F. Wood Blocking: For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

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

2.7 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1.

1. Grade: Exterior, A-C , fire-retardant treated.
2. Thickness: As indicated on the drawings or, if not indicated, not less than 3/4-inch nominal thickness.

2.8 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

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 A153/A153M or ASTM F2329.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

2.9 METAL FRAMING ANCHORS

A. Manufacturers: subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Simpson Strong-Tie Co., Inc..
2. MiTek Industries, Inc.
3. Approved Equal.

B. 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.

C. Materials: Unless otherwise indicated, fabricate from the following materials:

1. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.

   a. Use for interior locations unless otherwise indicated.

2. Heavy-Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M; 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.

   a. Use for wood-preservative-treated lumber and where indicated.

2.10 ACCESSORIES

A. Sill-Sealer Gasket:

1. Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch

nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

C. Water-Repellent Preservative: Formulation containing 3-iodo-2-propynyl butylcarbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION OF ROUGH CARPENTRY, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Plywood Backing Panels: Install 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 anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Sill-Sealer Gasket: Install gasket to form continuous seal between sill plates and foundation walls.

F. Sill-Sealer Gasket and Termite Barrier: Install gasket and termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

G. Do not splice structural members between supports unless otherwise indicated.

H. 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.

I. 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 ft. o.c.

J. Sort and select lumber so that natural characteristics do 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.

K. Field Application of Preservative Treatment: Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron (SBX) for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

L. Flexible Flashing: Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

M. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in ICC's "International Building Code" (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
3. ICC-ES evaluation report for fastener.

N. Use 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.

3.2 INSTALLATION OF ROOFING NAILERS

A. Install roofing nailers where indicated on Drawings and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Securely attach roofing nailers to substrates by anchoring and fastening to withstand bending, shear, or other stresses imparted by Project wind loads and fastener-resistance loads as designed in accordance with ASCE/SEI 7.

C. Securely attach roofing nailers to substrate to resist the designed outward and upward wind

loads indicated on Drawings and in accordance with SPRI ED-1, Tables A6 and A7.

3.3 INSTALLATION OF WOOD BLOCKING

A. Install wood blocking where indicated on Drawings 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. 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.

3.4 INSTALLATION OF WOOD FURRING

A. Install wood furring level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at 24 inches o.c.

C. Furring to Receive Gypsum Board or Plaster Lath: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

3.5 INSTALLATION OF WALL AND PARTITION FRAMING

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

1. For exterior walls, provide 2-by-6-inch nominal- size wood studs spaced 16 inches o.c. unless otherwise indicated.
2. 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 partitions.

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 load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated or, if not indicated, in accordance with Table R602.7(1) or Table R602.7(2), as applicable, in ICC's "International Residential Code for One- and Two-Family Dwellings".

3.6 INSTALLATION OF CEILING JOIST AND RAFTER FRAMING

A. 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. Where 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.

B. 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 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

C. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.7 PROTECTION

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

END OF SECTION

SECTION 06 16 00
SHEATHING

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.

1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant glass-mat gypsum sheathing.

1. Installer is to be licensed by ABAA in accordance with ABAA's Quality Assurance Program and is to employ ABAA-certified installers and supervisors on Project.

B. Testing Agency Qualifications:

1. 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.
2. For testing and inspecting agency providing tests and inspections related to air-barrier and water-resistant glass-mat gypsum sheathing meeting the requirements as follows:

   a. Independent agency, qualified in accordance with ASTM E329 for testing indicated, and certified by ABAA.

1.3 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD STRUCTURAL PANEL PRODUCTS

A. General: Wood structural panels include plywood, mat-formed (nonveneer) panels such as oriented strand board, and composite panels, which are veneer-faced panels with mat-formed cores.

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated on Drawings.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 WALL SHEATHING

A. Plywood Sheathing, Walls:

1. Classification: Either DOC PS 1 or DOC PS 2, Exposure 1, Structural I sheathing.
2. Span Rating: Not less than 16/0.
3. Nominal Thickness: As indicated on Drawings.

B. Oriented-Strand-Board Sheathing, Walls:

1. Classification: DOC PS 2, Exposure 1, Structural I sheathing.
2. Span Rating: Not less than 24/0.
3. Nominal Thickness: Not less than 1/2 inch.

2.4 ROOF SHEATHING

A. Plywood Sheathing, Roofs:

1. Classification: Either DOC PS 1 or DOC PS 2, Exterior, Structural I sheathing.
2. Span Rating: Not less than 24/0.
3. Nominal Thickness: Refer to Drawings.

2.5 COMPOSITE NAIL BASE INSULATED ROOF SHEATHING

A. Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing: ASTM C1289, Type V with DOC PS 2, Exposure 1 oriented strand board on one face.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Atlas Molded Products, a division of Atlas Roofing Corporation
   b. Cornell Performance Building Products, a Subsidiary of GAF
   c. Hunter Panels; a Carlisle Company
   d. Johns Manville; a Berkshire Hathaway company
   e. Rmax, A Business Unit of Sika Corporation

2. Polyisocyanurate-Foam Thickness: Refer to Drawings.
3. Oriented-Strand-Board Nominal Thickness: 7/16 inch.

B. Vented, Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing: ASTM C1289, Type II, Class 1, with DOC PS 2, Exposure 1 oriented strand board adhered to spacers on one face.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Cornell Performance Building Products, a Subsidiary of GAF
   b. Hunter Panels; a Carlisle Company
   c. Johns Manville; a Berkshire Hathaway company

2. Polyisocyanurate-Foam Thickness: 1 inch.
3. Oriented-Strand-Board Nominal Thickness: 7/16 inch.
4. Spacers: Wood furring strips or blocks not less than 3/4 inch thick and spaced not more than 16 inches o.c.

2.6 MISCELLANEOUS MATERIALS

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

1. For roof sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

E. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in the ICC's "International Building Code."
2. ICC-ES evaluation report for fastener.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANELS

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
b. Space panels 1/8 inch apart at edges and ends.

3.3 INSTALLATION OF AIR-BARRIER AND WATER-RESISTANT GLASS-MAT GYPSUM SHEATHING

A. Install accessory materials in accordance with sheathing manufacturer's written instructions and details to form a seal with adjacent construction, to seal fasteners, and ensure continuity of air and water barrier.

1. Coordinate the installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing, so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Connect and seal sheathing material continuously to air barriers specified under other Sections as well as to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

D. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip, so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over solid bearing to perimeter frames, with not less than 1 inch of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.
2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

E. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.

F. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

G. Seal top of through-wall flashings to sheathing with an additional 6-inch- wide transition strip.

H. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

I. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending 6 inches beyond repaired areas in strip direction.

3.4 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Testing and Inspecting Agency: Engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Strips and transition strips have been firmly adhered to substrate.
3. Compatible materials have been used.
4. Transitions at changes in direction and structural support at gaps have been provided.
5. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
6. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier sheathing assemblies will be tested for evidence of air leakage in accordance with ASTM E1186, chamber pressurization or depressurization with smoke tracers.

E. Air barriers will be considered defective if they do not pass tests and inspections.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

END OF SECTION

SECTION 06 20 13
EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 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 net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

B. Samples for Verification:

1. For each species and cut of lumber and panel products, with half of exposed surface finished; 50 sq. in. for lumber and 8 by 10 inches for panels.
2. For engineered wood siding and soffits, 50 sq. in. for board types and 8 by 10 inches for panels.

1.2 INFORMATIONAL SUBMITTALS

A. Compliance Certificates:

1. For lumber that is not marked with grade stamp.
2. For preservative-treated wood that is not marked with treatment-quality mark.

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

1. Wood-preservative-treated wood.
2. Cellular PVC trim.
3. Foam-plastic moldings.

C. Sample Warranties: For manufacturer's warranties.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

1.4 FIELD CONDITIONS

A. Weather Limitations: 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.

B. 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 splotchy surface contamination and discoloration.

1.5 WARRANTY

A. Engineered Wood Manufacturer's Warranty: Manufacturer agrees to repair or replace components of engineered wood siding soffits and trim that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, deformation or deterioration beyond normal weathering.
2. Warranty Period for Factory-Applied Finish: Five years from date of Substantial Completion.
3. Warranty Period: Siding Soffits and Trim25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of inspection agency, indicating grade, species, moisture content at time of surfacing, and mill.
2. For exposed lumber, mark grade stamp on end or back of each piece .

B. Softwood Plywood: DOC PS 1.

C. Hardboard: ANSI A135.4.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Water-Repellent Preservative Treatment by Nonpressure Process: AWPA N1; dip, spray, flood, or vacuum-pressure treatment.

1. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate , combined with an insecticide containing chloropyrifos (CPF).

2. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
3. Application: Exterior trim and wood siding.

B. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3a UC3b.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.
2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
4. Do not use material that is warped or does not comply with requirements for untreated material.
5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.

    a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

    a. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.

7. Application: All exterior lumber and plywood.

2.3 EXTERIOR TRIM

A. Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade:

    a. White Oak; NLGA, WCLIB, or WWPA 1 Common.

2. Maximum Moisture Content: 19 percent Finger Jointing: Not allowed
3. Face Surface: Saw textured.

2.4 LUMBER SIDING

A. Provide kiln-dried lumber siding complying with DOC PS 20, factory coated with exterior primer compatible with topcoats specified.

B. Species and Grade:

1. White Oak; NeLMA, NLGA, WCLIB, or WWPA 1 Common.

C. Pattern:

1. Wavy Edge Bevel siding, 1x10, rough sawn, actual overall dimensions of 9-1/4 by 1-3/32 inches, measured on the face and thick edge. Bevel siding to have wavy edge at exposed bottom.

2.5 LUMBER SOFFITS

A. Provide kiln-dried lumber siding complying with DOC PS 20, factory coated with exterior primer compatible with topcoats specified.

B. Species and Grade:

1. White Oak; NeLMA, NLGA, WCLIB, or WWPA .

C. Pattern:

1. V-edge, smooth-faced tongue and groove, actual face width 5-1/8 by 23/32 inch.

2.6 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.

1. For face-fastening siding, provide ringed-shank siding nails unless otherwise indicated.
2. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.
3. For pressure-preservative-treated wood, provide hot-dip galvanized-steel fasteners.
4. For applications not otherwise indicated, provide hot-dip galvanized-steel or aluminum fasteners.

B. Wood Glue: Waterproof resorcinol glue recommended by manufacturer for exterior carpentry use.

C. Adhesive for Cellular PVC Trim: Product recommended by trim manufacturer.

D. Flashing: Comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.

E. Insect Screening for Soffit Vents: Aluminum, 18-by-16-inch black mesh.

F. Continuous Soffit Vents: Manufactured of corrosion-free, extruded, high-density polypropylene..

1. Net-Free Area: 10 sq in per lin. ft.
2. Dimensions: 1 inch wide by 48 inches long by 1-1/2 inch high.
3. Finish: Black

G. Rainscreen: Vertically channeled, three-dimensional polyester rainscreen with integrated filter fabric.

1. Thickness: 1/4 inches

2.7 FABRICATION

A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed.

1. Cut to required lengths and prime ends.
2. Comply with requirements in Section 099113 "Exterior Painting."

C. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

D. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut exterior finish carpentry to fit adjoining work.
3. Refinish and seal cuts as recommended by manufacturer.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate exterior finish carpentry with materials and systems in or adjacent to it.
6. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.3 INSTALLATION OF STANDING AND RUNNING TRIM

A. Install flat-grain lumber with bark side exposed to weather.

B. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary.

1. Use scarf joints for end-to-end joints.
2. Stagger end joints in adjacent and related members.

C. Fit exterior joints to exclude water.

1. Cope at returns and miter at corners to produce tight-fitting joints, with full-surface contact throughout length of joint.
2. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.

D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.4 INSTALLATION OF SIDING

A. Install siding to comply with manufacturer's written instructions and warranty requirements.

B. Horizontal Lumber Siding:

1. Apply starter strip along bottom edge of sheathing or sill.
2. Install first course of siding, with lower edge at least 1/8 inch below starter strip and subsequent courses lapped 1 inch over course below.
3. Nailing:

   a. Use stainless steel “splitless” nails
   b. Nail Shank- a ring threaded or spiral threaded nail shank should be used for proper holding power.
   c. Nail Point - use a blunt medium diamond or blunt medium needle point.
   d. Nail Size - Use 8 d siding nails
   e. Nail Penetration & Spacing - nail penetration into solid wood base is 1-1/2". Bevel siding should be nailed to studs at 24'' o.c. with solid sheathing and 16" o.c. maximum when applied without sheathing.
   f. All butt joints should be mitred and nailed on the stud. Do not double nail siding at the joint. Use one nail only.
   g. Never Nail Through Two Pieces of Siding - Nailing should be snug but not tight. The recommended procedure is for the nail to be driven through the butt edge of the overlapping siding a minimum of 1/8" above the thin edge of the underlying piece. The nail should be kept as close as possible to 1/8" above and should never exceed 1/4" above the thin edge of the underlying piece. Never nail through 2 pieces or courses of siding.
4. Leave 1/8-inch gap at trim and corners unless otherwise recommended by manufacturer, and apply sealant.
5. Butt joints only over framing or blocking, nailing top and bottom on each side and staggering joints in subsequent courses.

C. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer.

D. Finish: Apply finish within two weeks of installation. Pre-finish back side of siding before installation with two coasts of stain for wood protection.

3.5 ADJUSTING

A. Replace exterior finish carpentry that is damaged or does not comply with requirements.

1. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

B. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean exterior finish carpentry on exposed and semiexposed surfaces.

B. Touch up factory-applied finishes to restore damaged or soiled areas.

3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and 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 splotchy surface contamination and discoloration.

END OF SECTION

SECTION 06 20 23
INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data:

1. Interior trim.

B. Product Data Submittals: 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 net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

C. Samples for Verification:

1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. for lumber and 8 by 10 inches for panels.
2. For foam-plastic moldings, with half of exposed surface finished; 50 sq. in..
3. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.3 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and

HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. 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 splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's 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, mark grade stamp on end or back of each piece .

B. Softwood Plywood: DOC PS 1.

2.2 INTERIOR TRIM

A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade:
   a. Douglas fir-larch or Douglas fir south; NLGA, WCLIB, or WWPA Superior or C & Btr finish.
2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
3. Finger Jointing: Not allowed.
4. Face Surface: Surfaced (smooth).

2.3 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Multipurpose Construction Adhesive: Formulation, complying with ASTM D3498, that is recommended for indicated use by adhesive manufacturer.

2.4 FABRICATION

A. Back out or kerf backs of the following members, except those with ends exposed in finished work:

1. Interior standing and running trim, except shoe and crown molds.
2. Wood-board paneling.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements.

1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

B. Adjust joinery for uniform appearance.

3.5 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces.

B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.6 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and 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 splotchy surface contamination and discoloration.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.2 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

B. Research Reports: For foam-plastic insulation, from ICC-ES.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

B. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

C. Thermal-Resistance Value: R-value as indicated on Drawings in accordance with ASTM C518.

2.2 COMPOSITE INSULATING WALL SHEATHING

A. Composite Insulating Wall Sheathing: Oriented-strand-board Exposure 1 sheathing 7/16 inch (11.1 mm) thick, with factory-laminated water-resistive barrier exterior facer, and with rigid foam plastic insulating board laminated to interior face.

1. Basis-of-Design: Huber Engineered Woods LLC; ZIP System® R-sheathing.
2. Characteristics:

    a. Span Rating and Performance Category of Sheathing Layer: Not less than 24/16; 7/16 Performance Category.
    b. Thickness: 2 inch .
    c. Thermal Resistivity (R Value): 9 deg F x h x sq. ft./Btu x in. at 75 deg F
    d. Edge Profile: Square edge.
    e. Weather Barrier Facer: Medium-density, phenolic-impregnated polymer-modified sheet material meeting requirements for weather-resistive barrier in accordance with *ICC-ES AC38 – Water-Resistive Barriers*, with fastener spacing symbols on exterior facer for 16-inch (406 mm) and 24-inch (610 mm) on center spacing, with the following characteristics

        1) Water Resistance of Coatings: Pass 14 day exposure test in accordance with ASTM D2247 – Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity.
        2) Water-Vapor Permeance, Facer: Minimum 12 perms (689 ng/Pa x s x sq. m), when tested in accordance with *ASTM E96/E96M – Standard Test Methods for Water Vapor Transmission of Materials.*

2.3 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION (XPS)

A. Extruded Polystyrene Board Insulation, Type VI: ASTM C578, Type VI, 40 psi minimum compressive strength.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. DuPont de Nemours, Inc.
    b. Kingspan Insulation LLC
    c. Owens Corning
    d. The Dow Chemical Company

B. Extruded Polystyrene Foundation Panel

1. Basis of Design: Styro Industries FP Ultra Lite Foundation Panel, 1 inch

    a. Finish: To be selected by the Owners Representative from Manufacturer's full line.

2.4 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

A. Polyisocyanurate Board Insulation, Glass-Fiber-Mat Faced: ASTM C1289, glass-fiber-mat faced, Type II, Class 2.

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

to, the following:

a. Atlas Polyiso Roof and Wall Insulation
b. Carlisle Coatings & Waterproofing Inc
c. Johns Manville; a Berkshire Hathaway company

2.5 MINERAL-WOOL BLANKET INSULATION

A. Mineral-Wool Blanket Insulation, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; complying with ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Johns Manville; a Berkshire Hathaway company
b. Owens Corning
c. ROCKWOOL

2.6 INSULATION FASTENERS

A. Insulation Fastener Accessories: Provide double-pointed weld pins, lagging pins, quilting pins, duct liner pins, insulation hangers, specialty washers, special caps, j-hooks, capacitor discharge annular weld pins, capacitor discharge acoustical lagging pins, and other accessory materials that are recommended in writing by insulation fastener manufacturer to produce complete insulation supports.

B. Fasteners, General: Size and type complying with manufacturer's written instructions for Project conditions and requirements of authorities having jurisdiction.

2.7 ACCESSORIES

A. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, seam tape consisting of polyolefin film with acrylic adhesive, meeting *ICC-ES AC148 – Acceptance Criteria for Flexible Flashing Materials*, and tested as part of an assembly meeting performance requirements.

1. Basis-of-Design: Huber Engineered Woods; ZIP System™ flashing tape.
2. Characteristics

a. Adhesive type: Acrylic
b. Thickness: 0.012 inch (0.3 mm).
c. Tensile Strength: 938 psi
d. Elongation: 400-800 percent
e. Complies with AAMA 711 – Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration and ICC-ES AC148 – Acceptance Criteria for Flexible Flashing Materials,

B. Liquid-Applied Flashing Membrane: Gun-grade, cold-applied, silyl-terminated polymer (STP) liquid flashing membrane compatible with sheathing/weather barrier, self-adhering seam and

flashing tape, and tested as part of an assembly meeting performance requirements.

1. Basis-of-Design: Huber Engineered Woods; ZIP System™ liquid flash.
2. Characteristics

    a. Composition: Single component silyl-terminated polymer (STP)
    b. Application Temperature Range: Between 35 Deg F (2 Deg C) and 110 Deg F (43 Deg C) surface and ambient.
    c. VOC Content: 30 g/L
    d. Hardness, Shore A: 40 to 45 in accordance with ASTM C661 – Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer
    e. Tensile Strength: 75 psi in accordance with ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers
    f. Elongation at Break: 225 percent in accordance with ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers

C. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

D. Miscellaneous Application Accessories:

1. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
2. Crack Sealer: Closed-cell insulating foam in aerosol dispenser recommended in writing by insulation manufacturer for filling gaps in board insulation.
3. Curtain-Wall Insulation Clips: Z-shaped galvanized steel as recommended in writing by insulation manufacturer.
4. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.
5. Detailing Foam Insulation for Voids: Urethane foam complying with AAMA 812, low expansion pressure suitable for filling insulation gaps and voids adjacent to openings to protect against water, air, and sound intrusion.
6. Tapes for Reflective Insulation and Barriers:

    a. Aluminum-foil tape for repairs or splicing material.
    b. Double-sided tape for adhering to metal framing or overlapping material.
    c. Reinforced-foil tape for sealing tears or cuts in sheet vapor barrier.

7. Clip-and-Pin Components:

    a. Beam/Bar Joist Clips: For beams, bar joists, and Z-type purlins.
    b. C-Purlin Clips: For C-type purlins.

c. Angle Clips: For sidewalks and floors.
d. Tube Clips: For wood beams and metal tubular framing.
e. Locking Washers: Aluminum; white to match reflective bubble insulation facing colors.

8. Wire Mesh Lath Support for Insulation: ASTM C1032.

a. Material: Woven wire lath 1-1/2-inch hexagonal-shaped mesh with minimum 0.0510-inch- diameter, galvanized-steel wire.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or those that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products, applications and applicable codes.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive in accordance with manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 36 inches below exterior grade line.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive in accordance with anchor manufacturer's written instructions.
2. Space anchors in accordance with insulation manufacturer's written instructions for insulation type, thickness, and application.
3. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
4. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
5. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing in accordance with manufacturer's written instructions.

3.5 INSULATED SHEATHING INSTALLATION

A. General: Install sheathing panels in accordance with manufacturer's written instructions, requirements of applicable Evaluation Reports, and requirements of authorities having jurisdiction.

1. Do not bridge expansion joints; allow joint spacing equal to spacing of structural supports.
2. Install panels with laminated facer to exterior. Stagger end joints of adjacent panel runs. Support all panel edges.
3. Panel Edge Spacing: In accordance with sheathing panel manufacturer recommendations.
4. Attach sheathing panels securely to substrate with manufacturer-approved fasteners in compliance with the following:

   a. ICC-ES ESR-1539 - Power Driven Nails for Use in Engineered and Non-Engineered Connections or ICC-ES NER-272 - Power Driven Nails for Use in All Types of Building Construction
   b. IBC - International Building Code Table 2304.9.1 Fastening Schedule.

3.6 SEAM AND PENETRATION TREATMENT

A. Assembly continuity: Coordinate sheathing installation with flashing and joint sealant sequencing and installation and with adjacent building air and moisture barrier components to provide complete, continuous air- and moisture- barrier.

B. Tape panel seams, penetrations, and facer defects or cracks with self-adhering seam tape to form continuous weathertight surface. Apply tape according to manufacturer's written instructions and requirements of ICC-ES applicable to tape application.

C. Flash penetrations, gaps, and cracks with liquid-applied flashing membrane to form continuous weathertight surface. Apply according to manufacturer's written instructions. Follow manufacturer’s recommendation for integration with self-adhering seam tape.

D. Tape window and doors openings and radius penetrations with self-adhering flexible flashing tape to form continuous weathertight surface. Apply tape according to manufacturer's written instructions and requirements of ICC-AC applicable to tape application.

3.7 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended in writing by manufacturer.

1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.
3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

3.8 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members in accordance with the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install unfaced blanket insulation over ceiling area in thickness indicated. Where partitions occur, extend insulation up either side of partition.
5. For wood-framed construction, install blankets in accordance with ASTM C1320 and as follows:

   a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
2. Detailing Foam Insulation for Voids: Apply in accordance with manufacturer's written instructions.

C. Spray-Applied Cellulosic Insulation (closed cell): Apply spray-applied insulation in accordance with manufacturer's written instructions.

1. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked.
2. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

3.9 INSTALLATION OF BOARD INSULATION

A. Install board insulation in accordance with manufacturer's written instructions per project applications and conditions.

3.10 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07 41 13.16
STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal roof panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal roof panel Installer, metal roof panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal roof panels, including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal roof panel installation, including manufacturer's written installation instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review loading limitations of supporting structure during and after roofing.
6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal roof panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal roof panel systems during and after installation.
9. Review procedures for repair of metal roof panels damaged after installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For standing-seam metal roof panels. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal roof panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: Manufacturer's standard color charts, showing full range of available colors for each type of exposed finish.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: Actual sample of finished products for each type of exposed finish for metal roof panels and metal panel accessories.

1. Size: Manufacturers' standard size.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates for portable roll-forming equipment.

B. Product Test Reports: For standing-seam metal roof panels, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Qualification Statements: For roof installers.

E. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal roof panels.

1.6 QUALITY ASSURANCE

A. Roof Installer Qualifications: Entity that employs a supervisor who is an NRCA ProCertified Roofing Foreman or installers who are NRCA ProCertified Metal Panel Roof Systems Installers.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness, with positive slope for drainage of water. Do not store metal roof panels in contact with other materials that

might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal roof panels during installation.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed in accordance with manufacturers' written installation instructions and warranty requirements.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal roof panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metal and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

C. Special Weathertightness Warranty: Manufacturer agrees to repair or replace standing-seam metal roof panel systems that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal roof panel systems capable of withstanding the effects of the following loads when tested in accordance with ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E1646 or ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

C. Watertightness: No water penetration when tested in accordance with ASTM E2140 for hydrostatic-head resistance.

D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 30.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS, GENERAL

A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with seamed joint type indicated and mechanically attaching panels to supports using concealed fasteners in side laps. Include all accessories required for weathertight installation.

2.3 VERTICAL-RIB, SEAMED-JOINT, STANDING-SEAM METAL ROOF PANELS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. ATAS International, Inc.
2. CENTRIA, a Nucor Brand
3. Dimensional Metals, Inc.
4. Pac-Clad, Petersen; a Carlisle Company

B. Metal Roof Panels: Formed with vertical ribs at panel edges; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Material: Aluminum.
2. Seam Type: Double folded.
3. Panel Profile: Intermediate stiffening ribs symmetrically spaced between ribs.
4. Panel Coverage: 16 inches .
5. Panel Height: 2.0 inches.
6. Clips: Two piece, floating, designed to accommodate thermal movement.

a. Stainless Steel Clips: 0.0250-inch- thick, stainless steel sheet.
b. Clip Spacing: As indicated on approved Shop Drawings.

2.4 METAL ROOF PANEL MATERIAL

A. Aluminum Sheet: Coil-coated sheet, ASTM B209/B209M, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

1. Thickness: 0.040 inch.
2. Surface: Smooth, flat texture.
3. Exterior Finish: Three-coat fluoropolymer.
4. Color: As selected by Architect from manufacturer's full range.

2.5 VAPOR RETARDER

A. Butyl Rubber Sheet Vapor Retarder, Self-Adhering: Polyethylene film laminated to layer of butyl rubber adhesive, minimum 30-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.

2.6 ROOF INSULATION

A. Insulation over Solid Deck:

1. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 3 uncoated glass-fiber facer on both major surfaces.

   a. Manufacturers: Subject to compliance with requirements, provide products by the following:

      1) Atlas Polyiso Roof and Wall Insulation
      2) Carlisle SynTec Systems; a Carlisle Company
      3) Johns Manville; a Berkshire Hathaway company
      4) Kingspan Insulation LLC

   b. Compressive Strength: Grade 2, 20 psi.
   c. Size: 48 by 48 inches 48 by 96 inches.
   d. Thickness:

      1) Base Layer: 2".
      2) Upper Layer: 2".

2. Composite Polyisocyanurate Board Insulation: ASTM C1289, with factory-applied facing board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other surface.

   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      1) Carlisle SynTec Systems; a Carlisle Company
      2) Hunter Panels; a Carlisle Company

b. Facer: Type V oriented strand board facer, 7/16 inch thick.
c. Size: 48 by 96 inches.
d. Thickness: Per Drawings.

2.7 UNDERLAYMENT

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle WIP Products; a brand of Carlisle Construction Materials
b. GCP Applied Technologies Inc.
c. Owens Corning
d. Protecto Wrap Company
e. SDP Advanced Polymer Products Inc.

2. Thermal Stability: Stable after testing at 220 deg F; ASTM D1970/D1970M.
3. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970/D1970M.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.8 RAIL-TYPE SNOW GUARDS

A. Rail-Type, Seam-Mounted Snow Guards:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Alpine SnowGuards:
b. Berger; division of OmniMax International, Inc.
c. LMCurbs.
d. PMC Industries, Inc.
e. Basis of Design: S-5! Metal Roof Innovations, Ltd.: ColorGard® to match roofing

2. Description: Snow guard rails fabricated from metal pipes, bars, or extrusions, anchored to brackets and equipped with three rails.
3. Brackets and Baseplate: ASTM B209 aluminum; mill finished.
4. Bars: ASTM B221 aluminum; mill finish.
5. Profile: Flat Bar.
6. Seam clamps: ASTM B221 aluminum extrusion or ASTM B85/B85M aluminum casting with stainless steel set screws incorporating round nonpenetrating point; designed for use with applicable roofing system to which clamp is attached.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design snow guards, including attachment to roofing material and roof deck, as applicable for attachment method, based on the following:

1. Roof snow load.
2. Snow drifting
3. Roof slope.
4. Roof type.
5. Roof dimensions.
6. Roofing substrate type and thickness.
7. Snow guard type.
8. Snow guard fastening method and strength.
9. Snow guard spacing.
10. Coefficient of Friction Between Snow and Roof Surface: 0.
11. Factor of Safety: 2.
12. Structural Performance: Snow guards shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
13. Snow Loads: As indicated on Drawings.

2.9 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, minimum ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 coating designation. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Roof Panel Accessories: Provide components required for a complete, weathertight metal roof panel system including trim, copings, fasciae, mullions, sills, corner units, fasteners, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
2. Backing Plates: Provide metal backing plates at roof panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal roof panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

D. Gutters: Formed from same material as metal roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, of size and metal thickness in accordance with manufacturer's recommendations. Furnish gutter

supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.

E. Downspouts: Formed from same material as metal roof panels. Fabricate in 10 ft. long sections, complete with formed elbows and offsets, of size and metal thickness in accordance with manufacturer's recommendations. Finish downspouts to match gutters.

F. Roof Panel Fasteners: Self-tapping screws designed to withstand design loads.

G. Roof Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with metal roof panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.10 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-site Fabrication: Subject to compliance with requirements of this Section, metal roof panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate in accordance with equipment manufacturer's written instructions and to comply with details shown.

C. Provide roof panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal roof panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

3. Seams for other than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with manufacturer's recommendations.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not permitted on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal roof panel manufacturer.

    a. Size: As recommended by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.11 FINISHES

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

B. 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 same piece are unacceptable. 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.

C. Aluminum Roof Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and metal roof panel manufacturer's written installation instructions.

3.3 INSTALLATION OF ROOF INSULATION

A. General: Install insulation concurrently with metal roof panel installation, in thickness indicated to cover entire surface, in accordance with manufacturer's written installation instructions.

1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
2. Tape joints and ruptures in vapor retarder and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal roof panels fastened to secondary framing.
2. Between-Purlin Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Hold in place with bands and crossbands below insulation.

3.4 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the roof area indicated below:

a. Roof perimeter for a distance up from eaves of 24 inches beyond interior wall line.
b. Rake edges for a distance of 18 inches.
c. Hips and ridges for a distance on each side of 12 inches.
d. Roof-to-wall intersections for a distance from wall of 18 inches.
e. Around dormers, chimneys, skylights, and other penetrating elements for a

distance from element of 18 inches.

B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.

C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

3.5 INSTALLATION OF STANDING-SEAM METAL ROOF PANELS

A. Install metal roof panels in accordance with manufacturer's written installation instructions and approved Shop Drawings in orientation, sizes, and locations indicated. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal roof panels.
2. Flash and seal metal roof panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal roof panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal roof panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal roof panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Roof Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Roof Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Stainless Steel Roof Panels: Use stainless steel fasteners.
4. Copper Roof Panels: Use copper, stainless steel, or hardware-bronze fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal roof panel manufacturer.

D. Concealed Clip, Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

E. Clipless, Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with screw fasteners at each lapped joint at location and spacing recommended by manufacturer.

F. Roof Panel Joints: Fasten panel joints to substrate in accordance with manufacturer's instructions.

1. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
2. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
3. Watertight Installation:

a. Apply a continuous ribbon of sealant or tape to seal joints of metal roof panels, using sealant or tape as recommended in writing by manufacturer as needed to make panels watertight.
b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

H. Flashing and Trim: Comply with performance requirements and manufacturer's written installation instructions. Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

I. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal

expansion.

J. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

K. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

L. Pipe and Conduit Penetrations: Fasten and seal to metal roof panels as recommended by manufacturer.

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 ft. on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.8 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 47 13

NATURAL SLATE RAINSCREEN CLADDING SYSTEMS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Cladding System Assembly: Cladding materials, attachment system components, integral flashings, miscellaneous metal framing, and accessories necessary for a complete façade assembly.

B. Drained and Back-Ventilated Rainscreen System: Cladding system assembly designed to drain and dry cavity of water through drainage channels, weeps, and air ventilation.

1.2 COORDINATION

A. Coordinate slate cladding system installation with construction of other adjoining work to ensure proper sequencing and to provide a secure and noncorrosive installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product and component included in slate cladding system.

B. Shop Drawings: Show details of relationship of materials with adjacent construction, including fastening and anchorage connection details.

1. Include layout, spacings, sizes, and thicknesses of slate cladding systems and fastening and anchorage details, including mechanical fasteners.
2. Indicate accessories, connection details, and attachment to adjoining Work.

C. Samples: For slate cladding tiles; full size.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Test Reports: For each listed product.

C. Sample Warranty: For manufacturer's materials warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For slate cladding tiles, to include in maintenance manuals.

B. Material warranties.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed, identified with labels describing contents.

1. Slate Cladding Tiles: 100 sq. ft. of each size used in Project.

1.7 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Current Technical Engineering Report holder as manufacturer of slate cladding systems from independent testing agency.

B. Product Tests: Certificates or data from a qualified independent testing agency indicating slate cladding systems comply with requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Comply with manufacturer's written instructions for storage and handling to prevent breakage, bending, warping, twisting, and surface, edge, or corner damage.

C. Protect components from weather damage.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work in accordance with manufacturer's written installation instructions.

1.10 WARRANTY

A. Material Warranty: Manufacturer agrees to repair or replace slate cladding tiles that fail in materials and/or workmanship related to shape integrity, moisture, breakage, and burning resistance for normal residential use within specified warranty period.

1. Shape Integrity: Any tile will resist warping.
2. Water Resistance: Any tile will resist water passage under normal weather conditions.
3. Breakage Resistance: Any tile will resist breakage.
4. Burn Resistance: Any tile will resist burning.
5. Warranty Period: 100 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Provide components and materials specified in this Section from single manufacturer for a complete and compatible assembly.

2.2 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide slate cladding tiles and related materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

B. Structural Performance: Provide natural slate rainscreen cladding systems tested in accordance with ASTM E330/E330M and certified to be without permanent deformation or failure of structural members in accordance with design wind velocities for Project geographic location and probability of occurrence based on data from wind velocity maps provided in ASCE 7 and as approved by authorities having jurisdiction (AHJ).

1. Design Loads: As indicated on Drawings.

C. Temperature Range: Comply with structural loading requirements within temperature range of minus 55 to plus 180 deg F.

2.3 NATURAL SLATE RAINSCREEN CLADDING

A. Basis-of-Design Product: Subject to compliance with requirements, provide CUPACLAD; 101 Logic Natural Slate Rainscreen Cladding or comparable product by one of the following:

B. Slate Cladding Tiles: Manufacturer's standard noncombustible natural charcoal black/gray colored, cleft-faced slate tiles; hard, dense, and sound; with chamfered edges and predrilled fastener holes.

1. Thickness: Nominal 1/4 to 3/8 inch
2. Size: Nominal 16 by 8 inches

2.4 SUPPORT SYSTEM AND ACCESSORY COMPONENTS

A. Support System: Adjustable sub-framing components as recommended in writing by slate cladding manufacturer, consisting of thermally broken vertical and horizontal extruded aluminum framing battens with clips and brackets to meet performance requirements while accommodating a variety of rainscreen depths.

B. Continuous Insulation (CI): As specified in Section 07 21 00 "Thermal Insulation."

C. Finishing Accessories and Trim: Metal trim, angles, and similar components to meet performance requirements at corners, transitions, and rough openings.

D. Fasteners: Stainless steel self-tapping and self-drilling screws and other fasteners as recommended in writing by slate cladding manufacturer that are suitable for and compatible with system materials. Number, size, and type of fasteners to meet performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, supports, and other conditions affecting performance of the Work.

1. Verify that air barrier has been installed over substrate surfaces to prevent air infiltration and water penetration.

B. Examine roughing-in for components and systems penetrating slate cladding system to verify actual locations of penetrations relative to seam locations of slate cladding tiles before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate surfaces thoroughly prior to installation.

3.3 INSTALLATION

A. Install cladding support system in accordance with manufacturer's written instructions, approved submittals, and the following:

1. Install in proper relationship with adjacent materials.

2. Install slate cladding system level, plumb, and square within 1/8 inch in 20 ft. noncumulative allowable tolerance.

B. Install slate cladding tiles in accordance with manufacturer's written instructions, approved submittals, and in patterns, sizes, and locations as indicated on Drawings.

C. Install finishing accessories and trim at rough openings and edges to properly terminate slate cladding system.

3.4 CLEANING AND PROTECTION

A. On completion of slate cladding system installation, clean finished surfaces as recommended by manufacturer. Maintain in a clean condition during construction.

B. Replace slate cladding system components that have been damaged or have deteriorated beyond successful repair.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

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

B. Shop Drawings: For sheet metal flashing and trim.

1. Plans, elevations, sections, and attachment details.
2. Fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Identification of material, thickness, weight, and finish for each item and location in Project.
4. Details for forming, including profiles, shapes, seams, and dimensions.
5. Details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Details of termination points and assemblies.
7. Details of roof-penetration flashing.
8. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
9. Details of special conditions.
10. Details of connections to adjoining work.
11. Formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

1.2 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: Entity that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Installer Qualifications: Entity that employs a supervisor who is an NRCA ProCertified Roofing Foreman or installers who are NRCA ProCertified Architectural Metal Flashings and Accessories Installers.

C. For roof edge flashings and copings that are ANSI/SPRI/FM 4435/ES-1 tested , shop is to be listed as able to fabricate required details as tested and approved.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might

cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.5 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.6 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: **20** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, are to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim are not to rattle, leak, or loosen, and are to remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature

changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METAL MATERIALS

A. Sheet Metal Materials, General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209/B209M, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

1. Thickness: 0.040 inch.
2. Surface: Smooth, flat.
3. Color: As selected by Architect from manufacturer's full range (matching roofing color and finish).
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.3 UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment: Provide self-adhering, cold-applied, sheet underlayment, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ATAS International, Inc.
   b. Carlisle WIP Products; a brand of Carlisle Construction Materials
   c. Owens Corning

2. Thickness: 30 mils minimum.
3. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970/D1970M.
4. Low-Temperature Flexibility: Passes after testing at minus 20 deg F or lower; ASTM D1970/D1970M.

B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum of type required for application.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and

bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
    c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

1. Material: Silicone.

E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

2.5 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed

fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 ft. on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.6 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction:

1. General: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
   a. Aluminum: 0.032 inch thick.

2.7 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrates, and other conditions affecting performance of the Work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
2. Verify that air- or water-resistant barriers have been installed over substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

3.3 INSTALLATION OF SHEET METAL FLASHING AND TRIM, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners , protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.

7. Do not field cut sheet metal flashing and trim by torch.
8. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 ft. with no joints within 24 inches of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

a. Embed hooked flanges of joint members not less than 1 inch into sealant.
b. Form joints to completely conceal sealant.
c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
d. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 INSTALLATION OF SLOPED ROOF SHEET METAL FABRICATIONS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.
4. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 INSTALLATION OF WALL SHEET METAL FABRICATIONS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings.

3.6 INSTALLATION OF MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

3.7 INSTALLATION TOLERANCES

A. Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 ft. on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING

A. Clean and neutralize flux materials. Clean off excess solder.

B. Clean off excess sealants.

3.9 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Butyl joint sealants.

1.2 CLOSEOUT SUBMITTALS

A. Manufacturers' special warranties.

B. Installer's special warranties.

1.3 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the

following:

a. Pecora Corporation
b. Sika Corporation - Building Components
c. The Dow Chemical Company

2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested in accordance with ASTM C1248.

2.4 LATEX, WATER-BASED, AIR SEALANT

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Basis of Design: DAP® TOUCH 'N SEAL® AIR STOP ELASTOMERIC AIR SEALANT– Green
2. Sika Corporation - Building Components
3. The Dow Chemical Company

2.5 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Everkem Diversified Products, Inc.
b. Sherwin-Williams Company (The)
c. Sika Corporation - Building Components
d. Tremco Incorporated

2.6 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.
b. Pecora Corporation
c. Sika Corporation - Building Components

d. Tremco Incorporated

2.7 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Bostik; Arkema
b. Everkem Diversified Products, Inc.
c. GSSI Sealants
d. Pecora Corporation
e. Sika Corporation - Building Components

2.8 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C1330, Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Unglazed surfaces of ceramic tile.
    c. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint

widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 08 11 63.26

RESIDENTIAL ALUMINUM SCREEN AND STORM DOORS

PART 1 - GENERAL

1.1 SUBMITTALS

A. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.

B. Manufacturer's installation instructions shall be provided along with product data.

C. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).

D. Product Data: for each type and size of doors.

1. Catalog sheets, specifications, and installation instructions for door units.

E. Shop Drawings: for screen and storm doors.

1. Include plans, elevations, sections, and details; hardware; and attachments to other work.

F. Product Schedule: For aluminum terrace doors**. Use same designations indicated on Drawings**.

G. Quality Control Submittals:

1. Sample Warranty: For manufacturer's special warranty.

H. Contract Closeout Submittals

1. Maintenance Data: For finishes, weather stripping, operable panels, and operating hardware to include in maintenance manuals.

1.2 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of aluminum screen and storm doors that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. Aluminum Screen and Storm Doors: 5 years.
b. Screens: 5 years.
c. Hardware: 5 year for finishes/90-Day mechanical.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide PCA Products; Westmore A-500.

B. Source Limitations: Obtain aluminum terrace doors from single source from single manufacturer.

2.2 MATERIALS

A. Door Stiles and Rails, Frame Sections: Hollow extruded aluminum sections, structurally suitable for opening sizes.

1. Aluminum extrusions; 6063-T52.

B. Weatherstripping: wool pile or soft PVC.

A. Insect Screen: Aluminum mesh, woven to 18/14 size.

B. Corner Spigots: Die cast zinc alloy or extruded aluminum.

C. Fasteners: Stainless steel.

D. Window Track: Rigid vinyl extrusions.

2.3 HARDWARE

A. Hinges: Stainless steel leaves and pin, nylon thrust bearings.

B. Latch: Die cast steel or cast aluminum knob on exterior, lever or thumb push latch on interior, tumbler lock cylinder with two keys, steel pin and spring stop.

C. Closer: Adjustable, spring loaded, hydraulic cylinder with hold open feature.

D. Stop: Storm chain with spring safety cushion.

E. Weatherstripping: Full perimeter set in frame slot, full width of door leaf adjustable or retracting drop sill sweep.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

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

C. Appearance of Finished Work: 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.

2.5 ALUMINUM FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: Bronze.

2.6 FABRICATION

A. Fabricate storm and screen doors in sizes indicated. Include a complete system for assembling components and anchoring doors.

B. Weather Stripping: Provide full-perimeter weather stripping for each door panel.

C. Weep Holes: Provide weep holes and internal drainage passages to conduct infiltrating water to exterior.

D. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

E. Factory-Glazed Fabrication: Glaze doors in the factory where practical and possible for applications indicated.

PART 3 - EXECUTION

3.1 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 Work.

B. Verify rough opening dimensions, levelness of threshold substrate, and operational clearances.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Verify governing door dimensions with **opening dimensions** before door fabrication.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing doors, hardware, accessories, and other components.

B. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

C. Prepare frames for hardware.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Lubricate hardware and moving parts.

B. Adjust operating panels to provide a tight fit at contact points and weather stripping for smooth operation, without binding, and a weathertight closure. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.

C. Clean exposed surfaces immediately after installing doors. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, excess sealants, glazing materials, dirt, and other substances.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect door surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances contact door surfaces, remove contaminants immediately according to manufacturer's written instructions.

F. Refinish or replace doors with damaged finishes.

G. Replace damaged components.

END OF SECTION

SECTION 08 16 13

FIBERGLASS DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiberglass doors.

B. Fiberglass door frames.

1.2 REFERENCE STANDARDS

A. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

C. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).

D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2018.

E. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.

F. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2016.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

H. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

K. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007 (Reapproved 2016).

L. ICC (IBC) - International Building Code; 2018.

M. ITS (DIR) - Directory of Listed Products; current edition.

N. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.

O. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

P. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

Q. NFRC 100 - Procedure for Determining Fenestration Products U-Factors.

R. NFRC 400 - Procedure for Determining Fenestration Products Air Leakage.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Obtain hardware templates from hardware manufacturer prior to starting fabrication.

1.4 SUBMITTALS

A. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.

B. Shop Drawings: Indicate layout and profiles; include assembly methods.

1. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
2. Indicate wall conditions, door and frame elevations, sections, materials, gages, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on drawings to identify details and openings.

C. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.

D. Manufacturer's Qualification Statement.

E. Installer's Qualification Statement.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in the Authority's name and registered with manufacturer; include detailed terms of warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.

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

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Deliver pre-assembled doors and frames with braces, spreaders, and packaging as required to prevent damage.

C. Store materials in original packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.

1. Store at temperature and humidity conditions recommended by manufacturer.
2. Do not use non-vented plastic or canvas shelters.
3. Immediately remove wet wrappers.

D. Store in position recommended by manufacturer, elevated minimum 4 inch above grade, with minimum 1/4-inch space between doors.

1.7 FIELD CONDITIONS

A. Do not install doors until structure is enclosed.

B. Maintain temperature and humidity at manufacturer's recommended levels during and after installation of doors.

1.8 WARRANTY

A. Provide ten (10) year manufacturer warranty covering materials and workmanship, including degradation or failure due to chemical contact.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Pultruded Fiberglass Reinforced Plastic (FRP) Doors:

1. Special-Lite, Inc; AF 100 Pultruded Smooth Door; www.special-lite.com.
2. Approved Equal.

2.2 DOOR AND FRAME ASSEMBLIES

A. Door and Frame Assemblies: Factory-fabricated, prepared and machined for hardware.

1. Physical Endurance: Swinging door cycle test to ANSI/SDI A250.4, Level A (1,000,000 cycles) minimum; tested with hardware and fasteners intended for use on project.
2. Screw-Holding Capacity: Tested to 890 lbs, minimum.
3. Surface Burning Characteristics: Flame spread index (FSI) of 0 to 25, Class A, and smoke developed index (SDI) of 450 or less, when tested in accordance with ASTM E84.
4. Flammability: Self-extinguishing when tested in accordance with ASTM D635.

5. Sizes: As indicated on drawings.
6. Clearance Between Door and Frame: 1/8 inch, maximum.
7. Clearance Between Bottom of Door and Finished Floor: 3/4 inch, maximum; not less than 1/4-inch clearance to threshold.
8. Provide frame anchors that allow for variation in rough opening size; field cutting of doors or frames to fit is not permitted.

2.3 COMPONENTS

A. Doors: Fiberglass construction with reinforced core.

1. Thickness: 1-3/4-inch, nominal.
2. Core Material: Manufacturer's standard insulated core material for application indicated.
3. Construction:

   a. Pultruded as single monolithic fiberglass reinforced plastic (FRP) panel.

   b. Molded in one piece including through color gel coating on each side; manufacturer's standard subframe, core and faces fused during curing; hardware reinforcements.
   c. Fiberglass faces laminated to core with an applied gel coating, or molded in one piece including gel coating on each side.

4. Face Sheet Texture: Smooth grain.
5. Subframe and Reinforcements: Manufacturer's standard materials.
6. Waterproof Integrity: Provide factory fabricated edges, cut-outs, and hardware preparations of fiberglass reinforced plastic (FRP); provide cut-outs with joints sealed independently of glazing, louver inserts, or trim.
7. Hardware Preparations: Factory reinforce, machine, and prepare for door hardware including field installed items; provide solid blocking for each item; field cutting, drilling or tapping is not permitted; obtain manufacturer's hardware templates for preparation as necessary.

B. Door Frames: Provide type in compliance with performance requirements specified for doors.

1. Type: Factory assembled with chemically welded joints.
2. Profiles: As indicated on drawings.
3. Door Stop: 5/8-inch wide, by 1-7/8-inch deep.
4. Non-Fire-Rated:

   a. Fiberglass reinforced plastic (FRP) with gel-coating matching doors.

5. Corner Joints: Mitered with concealed corner blocks or angles of same material as frame; fiberglass and aluminum joined with screws; steel and stainless steel spot welded; sealed watertight with silicone sealant; field assemble knock-down type frames as required.
6. Hardware Cut-outs: Provide continuous backing or mortar guards of same material as frame, with watertight seal.

7. Frame Anchors: Stainless steel, Type 304; provide three anchors in each jamb for heights up to 84 inches with one additional anchor for each additional 24 inches in height.
8. Reinforcing: Provide manufacturer's standard reinforcing at hinge, strike, and closer locations.
9. Kerf frame to receive weatherstripping.

2.4 PERFORMANCE REQUIREMENTS

A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.

B. Fiberglass Skin.

1. Surface Burning, ASTM-E84; Flame Spread $\leq$ 25; Smoke Developed $\leq$ 450
2. Tensile Strength, ASTM-D638; 12,300 psi
3. Percentage Fiberglass: 50%

C. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf.

D. Air Leakage: Maximum of 0.1 cu ft/min/sq. ft. at 6.27 psf differential pressure, when tested in accordance with ASTM E283.

E. Structural Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

F. Thermal Transmittance, Exterior Doors: AAMA 1503, U-value of 0.35, maximum, measured on exterior door in size required for this project.

G. Fiberglass Reinforced Plastic (FRP) Face Sheet Properties:

1. Tensile Strength at Break: ASTM D638, 13,250 psi, minimum.
2. Water Absorption: ASTM D570, 0.16 percent, maximum, after 24 hours at 74 degrees F.
3. Flexural Strength: ASTM D790, 27,000 psi, minimum.

2.5 FINISHES

A. Gel Coating: Ultraviolet (UV) stabilized polyester finish.

1. Thickness: Minimum 15 mils wet thickness, plus/minus 3 mils.
2. Color: As selected by Director’s Representative from manufacturer's standard line of colors.

B. Abuse resistant engineered surface with protective coating and through-molded color.

1. Panel Texture: Smooth grain.
2. Color: As selected by Director’s Representative from manufacturer's full line of colors.

2.6 ACCESSORIES

A. Stops for Glazing: Fiberglass, unless otherwise indicated or required by fire rating; provided by door manufacturer to fit factory made openings, with color and texture to match door; fasteners shall maintain waterproof integrity.

1. Exterior Doors: Provide non-removable stops on exterior side with continuous compression gasket weatherseal.
2. Glazed Openings: Provide removable stops on interior side.
3. Opening Sizes and Shapes: As indicated on drawings.

B. Door Hardware: As specified in Section 08 71 00.

1. Weatherstripping
2. Thresholds: Fiberglass, with skid resistant surface, extends full width of door opening, 1/2-inch high by 6-inch wide; same color as frame.
3. See Specification Section 08 71 00 for additional hardware requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify actual dimensions of openings by field measurements before door fabrication; show recorded measurements on shop drawings.

B. Do not begin installation until substrates have been properly prepared.

3.2 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

B. Clean and prepare substrate in accordance with manufacturer's directions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.

B. Install exterior doors in accordance with ASTM E2112.

C. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances; anchor in place.

D. Set thresholds in continuous bed of sealant.

E. In masonry walls, install frames prior to laying masonry; anchor frames into masonry mortar joints; fill jambs with grout as walls are laid up.

F. In stud walls, install frames prior to building walls; anchor frames to studs using concealed anchors.

G. Separate aluminum and other metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.

H. Repair or replace damaged installed products.

3.4 ADJUSTING

A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.

B. Adjust hardware for smooth and quiet operation.

C. Adjust doors to fit snugly and close without sticking or binding.

3.5 CLEANING

A. Clean installed products in accordance with manufacturer's instructions prior to Director's Representative acceptance.

3.6 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 52 00
WOOD WINDOWS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, window rough openings, and details of installation, including anchor, flashing, and sealant installation.

C. Samples for Initial Selection: For units with factory-applied finishes, manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

1. Include Samples of hardware and accessories involving color selection.

D. Product Schedule: For wood windows. Use same designations indicated on Drawings.

1.2 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each wood window, for tests performed by qualified testing agency.

B. Field Quality-Control Reports: For wood windows.

C. Qualification Statements: For manufacturer and Installer.

D. Sample warranties.

1.3 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

1. Manufacturers' special warranties.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood windows to Project site in original, unopened packages and store them in accordance with manufacturer's written instructions. Protect wood windows against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Handle wood windows in a manner that prevents damage before, during, and after installation.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not install wood windows outside of limits recommended in writing by manufacturer.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures, including excessive deflection, water leakage, and air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of materials and finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: 10 years from date of Substantial Completion.
b. Glazing Units: 10 years from date of Substantial Completion.
c. Hardware: Three years from date of Substantial Completion.
d. Aluminum-Cladding Finish: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain wood windows from single source from single manufacturer.

B. Product 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. Window Certification: WDMA certified with label attached to each window.

C. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: LC. Minimum
2. Minimum Performance Grade: 25. minimum

D. Energy Performance: Certified and labeled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor): As determined in accordance with NFRC 100:
a. Operable Windows: Not more than 0.32 Btu/sq. ft. x h x deg F.

2. Solar Heat-Gain Coefficient (SHGC): As determined in accordance with NFRC 200:

a. Operable Windows: Not more than 0.36 as determined in accordance with NFRC 200.

3. Condensation-Resistance Factor: Provide windows tested for thermal performance in accordance with AAMA 1503, showing a CRF of 45 52.

E. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 2 for basic protection.

2.2 WOOD WINDOWS, GENERAL

A. Provide manufacturer's standard wood window assemblies consisting of frames, sashes, glass, hardware, fasteners, and all components and accessories as required for a complete installation.

2.3 ALUMINUM-CLAD WOOD WINDOWS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Andersen Windows, Inc.; Andersen Corporation; E-Series windows
2. Basis of Design: Marvin Ultimate AWNING PUSH OUT - NARROW FRAME
3. Pella Corporation; Reserve™ – Traditional Wood Awning Window

B. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Awning: Project out.

C. Exterior Surfaces: Manufacturer's standard aluminum cladding.

1. Baked-Enamel or Powder-Coat Finish: AAMA 2603, except with a minimum dry-film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and curing finish.

a. Color and Gloss: As selected by Architect from manufacturer's full range.

D. Interior Surfaces: Manufacturer's standard wood species.

1. Visible Finger Joints: Not allowed.
2. Finish: Manufacturer's standard factory-applied stain and transparent finish.

a. Color: As selected by Architect from manufacturer's full range.

2.4 WINDOW COMPONENTS

A. Frames and Sashes: Fine-grained wood lumber complying with AAMA/WDMA/CSA 101/I.S.2/A440; kiln dried to a moisture content of not more than 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide; water-repellent preservative treated.

B. Simulated Divided Lites (SDL): Fabricate glazing with simulated muntins ; provide muntin

configuration and profile indicated on Drawings.

C. Glass: Clear annealed glass, ASTM C1036, Type 1, Class 1, q3.

1. Kind: Fully tempered where indicated on Drawings.

D. Windborne-Debris-Impact-Resistant Insulating-Glass Units: ASTM E2190 with two lites and complying with impact-resistance requirements in "Performance Requirements" Article.

1. Exterior Lite: ASTM C1036, Type 1, Class 1, q3.

a. Tint: Clear.
b. Kind: Fully tempered.

2. Interior Lite: ASTM C1172 clear laminated glass with two plies of float glass.

a. Float Glass: Fully tempered.
b. Interlayer Thickness: As required by performance requirements indicated.

3. Filling: Fill space between glass lites with argon.
4. Low-E Coating: Pyrolytic on second surface.

E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

F. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: As indicated by manufacturer's designations.

G. Projected Window Hardware:

1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested in accordance with ASTM E405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.

a. Type and Style: As selected by Architect from manufacturer's full range of types and styles.

2. Hinges: Manufacturer's standard type for sash weight and size indicated.
3. Single-Handle Locking System: Operates positive-acting arms that pull sash into locked position. Provide one arm on sashes up to 29 inches tall and two arms on taller sashes.
4. Operator Stud Cover: Matching operator handle finish. Provide in locations where operator handle is removed for controlled access.
5. Pole Operators: Tubular-shaped anodized aluminum; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate window without reaching more than 60 inches above floor; one pole operator

and pole hanger per room that has operable windows more than 72 inches above floor.

H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

J. Mullions: Provide manufacturer's standard combination and reinforcing mullions and cover plates matching window units, complete with anchors for support to structure. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide reinforcing mullions and cover plates capable of withstanding design wind loads of window units.

2.5 ACCESSORIES

A. Jamb Extensions: Stain-grade Pacific Hemlock.

B. Nail Fins: Manufacturer's standard mounting flanges with holes prepunched for mechanical fasteners.

2.6 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.

1. Type and Location: Full, inside for project-out sashes.

B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
2. Finish for Interior Screens: Baked-on organic coating in color selected by Architect from manufacturer's full range.

C. Glass-Fiber Mesh Fabric: 20-by-20 or 20-by-30 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656/D3656M.

1. Mesh Color: Manufacturer's standard.

2.7 FABRICATION

A. Fabricate wood windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze wood windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 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. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF WOOD WINDOWS

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.

B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Mullions: Install combination and reinforcing mullions for combination assemblies in accordance with manufacturer's written instructions.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows using manufacturer's written instructions. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately in accordance with manufacturer's written instructions.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule concurrent with submissions 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.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

a. Identification number, location, hand, fire rating, size, and material of each door and frame.
b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
e. Fastenings and other installation information.
f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
g. Mounting locations for door hardware.
h. List of related door devices specified in other Sections for each door and frame.

C. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying

diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and Architectural Hardware Consultant.

B. Product Certificates: For each type of electrified door hardware.

1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

D. Field quality-control reports.

E. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

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

B. Schedules: Final door hardware and keying schedule.

1.5 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.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

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.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lockup for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.8 WARRANTY

A. Special Warranty: 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: Three years from date of Substantial Completion unless otherwise indicated below:
a. Exit Devices: Two years from date of Substantial Completion.
b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

A. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the USDOJ's "2010 ADA Standards for Accessible Design".

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the

wrist and that operate with a force of not more than 5 lbf.

2. Comply with the following maximum opening-force requirements:

   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
   b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
   c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 HINGES

A. Hinges: ANSI/BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Allegion plc
   b. McKinney Products Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY
   c. STANLEY; dormakaba USA, Inc.

2.4 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch latchbolt throw.

C. Lock Backset: 2-3/4 inches unless otherwise indicated.

D. Lock Trim:

1. Description: As indicated on Drawings.
2. Levers: Cast.
3. Escutcheons: Wrought Cast.
4. Dummy Trim: Match lever lock trim and escutcheons.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended

to protect frame; finished to match lock or latch.

1. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
2. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.

F. Mortise Locks: ANSI/BHMA A156.13, Operational Grade 1 Security Grade 1; stamped steel case with steel or brass parts; Series 1000.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Allegion plc
b. BEST Access Solutions, Inc.; dormakaba USA Inc.
c. SARGENT Manufacturing Company; ASSA ABLOY
d. STANLEY; dormakaba USA, Inc.
e. Yale Security Inc; ASSA ABLOY

2.5 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Allegion plc
b. BEST Access Solutions, Inc.; dormakaba USA Inc.
c. SARGENT Manufacturing Company; ASSA ABLOY
d. STANLEY; dormakaba USA, Inc.
e. Yale Security Inc; ASSA ABLOY

B. Standard Lock Cylinders: ANSI/BHMA A156.5, Grade 1 permanent cores; face finished to match lockset.

1. Core Type: Interchangeable.

C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.6 KEYING

A. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE." Information to be furnished by Owner.

2.7 SURFACE CLOSERS

A. Surface Closers: ANSI/BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Allegion plc
b. Corbin Russwin, Inc.; an ASSA ABLOY Group company
c. SARGENT Manufacturing Company; ASSA ABLOY
d. STANLEY; dormakaba USA, Inc.
e. Yale Security Inc; ASSA ABLOY

2.8 DOOR GASKETING

A. Door Gasketing: ANSI/BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Pemko Manufacturing Company Inc.; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY
b. Zero International; Allegion plc

B. Maximum Air Leakage: When tested in accordance with ASTM E283/E283M with tested pressure differential of 0.3 inch wg, as follows:

1. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.

2.9 THRESHOLDS

A. Thresholds: ANSI/BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Pemko Manufacturing Company Inc.; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY
b. Zero International; Allegion plc

2.10 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: ANSI/BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Allegion plc
b. inpro Corporation
c. Rockwood Manufacturing Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY

2.11 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and ANSI/BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended; however, aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.12 FINISHES

A. Provide finishes complying with ANSI/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

3.1 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 of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION OF DOOR HARDWARE

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.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."

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 work. 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 in accordance with 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. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate

offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.
2. Furnish permanent cores to Owner for installation.

F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

H. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

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.
2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant is to examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 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.

3.6 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, maintenance service is to include 12 months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies are to be manufacturer's authorized replacement parts and supplies.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

1. Coated glass.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass.

B. Product Test Reports: For fabricated glass, for tests performed by a qualified testing agency.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

C. Sample Warranties: For special warranties.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are

outside limits permitted by sealant manufacturer or are below 40 deg F.

1.6 WARRANTY

A. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations for Glass: Obtain glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems to withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing to withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

1. Design Wind Pressures: As indicated on Drawings.

   a. Wind Design Data: As indicated on Drawings.

2. Design Snow Loads: As indicated on Drawings.
3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
4. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

C. Windborne-Debris-Impact Resistance: Exterior glazing must pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 1 2 for basic protection.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR

1201, Category II.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
2. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
3. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
4. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

F. Glazing Publications: Comply with written instructions of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1 and AAMA TIR A7.
3. IGMA Publication for Sloped Glazing: IGMA TB-3001.
4. IGMA Publication for Insulating Glass: IGMA TM-3000.

G. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label indicates manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

H. Thickness: Where glass thickness is indicated, it is a minimum.

I. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.3 MONOLITHIC GLASS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AGC Glass Company North America, Inc.
b. Cardinal Glass Industries, Inc.
c. Vitro Architectural Glass

B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

C. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Cardinal Glass Industries, Inc.
b. Vitro Architectural Glass

D. Reflective- and Low-E-Coated Spandrel Glass: ASTM C1376, Kind CS.

2.4 INSULATING GLASS

A. Insulating Glass: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As indicated by manufacturer's designations.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC or acrylic foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. Type: EPDM with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Type: Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:

1. Type: EPDM with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass.

Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

3.4 INSTALLATION OF GLAZING TAPES

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 INSTALLATION OF GLAZING GASKET (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 INSTALLATION OF GLAZING SEALANT

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 PROTECTION

A. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

B. Remove and replace glass that is damaged during construction period.

END OF SECTION

SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.2 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.

1.3 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or manufacturer's written instructions, 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, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings in accordance with ASTM E90 and classified in accordance with ASTM E413; tested by a qualified testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide panel products in maximum lengths and widths available that will minimize joints in each area and that correspond with support system specified or indicated on Drawings.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. American Gypsum
b. CertainTeed; SAINT-GOBAIN

c. Georgia-Pacific Gypsum LLC
d. USG Corporation

2. Thickness: As indicated on Drawings.
3. Long Edges: Tapered.

B. Mold-Resistant Gypsum Board: ASTM C1396/C1396M; manufactured with moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. American Gypsum
b. CertainTeed; SAINT-GOBAIN
c. Georgia-Pacific Gypsum LLC
d. USG Corporation

2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.
4. Long Edges: Tapered.

C. Trim for Interior Gypsum Board: ASTM C1047.

1. Material: Galvanized-steel sheet or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.

D. Joint Treatment Materials for Interior Gypsum Board: Comply with ASTM C475/C475M requirements.

1. Joint Tape: Paper.
2. Joint Compound: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

a. Mold-Resistant Joint Compound: Use mold-resistant formulations with mold-resistant gypsum board products.
b. Prefilling: At open joints , rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
c. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
d. Fill Coat: For second coat, use drying-type, all-purpose compound.
e. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.4 TILE BACKING PANELS

A. Joint Treatment Materials for Tile Backing Panels: Comply with ASTM C475/C475M requirements.

1. Mold-Resistant Joint Compound: Use mold-resistant formulations with mold-resistant panel products.
2. Joint Tape: As recommended in writing by panel manufacturer.
3. Joint Compound for Tile Backing Panels:

a. Glass-Mat, Water-Resistant Gypsum Panel: As recommended in writing by panel manufacturer.
b. Coated Glass-Mat, Water-Resistant Gypsum Backing Panel: As recommended in writing by panel manufacturer.
c. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.5 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended in writing by manufacturer for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise specified or indicated on Drawings.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers as follows:

1. Non-Fire-Resistance-Rated Assemblies: Glass or slag or rock wool.
2. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

G. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF GYPSUM BOARD, GENERAL

A. Comply with ASTM C840 requirements.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form expansion (control) joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. 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.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919

requirements and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound-attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF 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 on Drawings.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise specified or indicated on Drawings 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 on Drawings or required by fire-resistance-rated assembly.

3. On Z-shaped 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.

B. Multilayer Application:

1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over studs or furring members and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated on Drawings or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

C. Trim for Interior Gypsum Board: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim in accordance with manufacturer's written instructions.

1. Cornerbead: Install at outside corners unless otherwise specified or indicated on Drawings.
2. L-Bead: Install where indicated on Drawings.
3. U-Bead: Install at exposed panel edges.

D. Base-of-Wall PVC Moisture Barrier Trim: Install at base of wall unless otherwise specified or indicated on Drawings.

E. Joint Treatment Materials for Interior Gypsum Board: Treat joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare panel surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

1. Prefill open joints , rounded or beveled edges, and damaged surface areas.
2. Apply joint tape over panel joints, except for trim products specifically indicated as not intended to receive tape.

F. Finish interior gypsum board panels to comply with levels indicated below and in accordance with ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated on Drawings.
2. Level 2: Panels that are substrate for tile.
3. Level 3: Where indicated on Drawings.

a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

3.4 PROTECTION

A. Protect adjacent surfaces from joint compound and promptly remove from floors and other non-gypsum board surfaces. Repair surfaces stained, marred, or otherwise damaged during gypsum board installation and finishing.

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 have gotten wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 09 30 13
CERAMIC TILING

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

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

B. Shop Drawings: Show locations, plans, and elevations, of each type of tile and tile pattern. Show widths, details, and locations of movement joints in tile substrates and finished tile surfaces. Show thresholds.

C. Samples for Initial Selection: For tile, grout, and accessories involving color selection or shade variation.

1.2 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product, including product use classification.

B. Product Test Reports:

1. Tile-setting and -grouting products.
2. Certified porcelain tile.

C. Slip-Resistance Test Reports: For each type of floor tile, from a qualified independent testing agency.

D. Field Quality Control Reports: Water test reports of membrane in wet areas.

E. Qualification Statements: For Installer.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 5 percent of amount installed for each type, composition, color, pattern, and size specified.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated for Project.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.6 WARRANTY

A. System Warranty: Manufacturer's non-prorated comprehensive warranty that agrees to repair and replace defective installation areas, material, and labor that fail under normal usage within specified warranty period.

1. Warranty Period: Five years from date of Product Purchase.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Tile: Obtain tile from single source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Accessory Products: Obtain each of the following products specified in this Section from a single manufacturer:

1. Stone thresholds.
2. Backer units.

2.2 CERAMIC TILE SYSTEM, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard Grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as

standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.3 PORCELAIN TILES

A. Porcelain Tile:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. American Olean; a brand of Dal-Tile Corporation
   b. Crossville, Inc.
   c. Daltile; a brand of Dal-Tile Corporation
2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: As indicated on Drawings.
4. Face Size Variation: Rectified.
5. Thickness: 3/8 inch.
6. Product Use Classification: Interior, Wet (IW).
7. Tile Color, Glaze, and Pattern: As selected by Architect from manufacturer's full range.
8. Grout Color: As selected by Architect from manufacturer's full range.

2.4 GLAZED WALL TILES

A. Glazed Wall Tile:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. American Olean; a brand of Dal-Tile Corporation
   b. Crossville, Inc.
   c. Daltile; a brand of Dal-Tile Corporation

2. Module Face Size: As indicated on Drawings.
3. Face Size Variation: Rectified.
4. Thickness: 5/16 inch.
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
6. Grout Color: As selected by Architect from manufacturer's full range.

2.5 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between

adjacent floor finishes.

1. Profile: Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

2.6 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges in maximum lengths available to minimize end-to-end butt joints.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. C-Cure
   b. Custom Building Products
   c. FinPan, Inc.
   d. James Hardie Building Products, Inc.
   e. USG Corporation

2. Thickness: 5/8 inch.
3. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

B. Joint Treatment Materials for Tile Backing Panels: Comply with ASTM C475/C475M requirements.

1. Mold-Resistant Joint Compound: Use mold-resistant formulations with mold-resistant panel products.
2. Joint Tape: As recommended in writing by panel manufacturer.
3. Joint Compound for Tile Backing Panels: As recommended in writing by tile backing panel manufacturer.

2.7 WATERPROOF MEMBRANES

A. General: Manufacturer's standard product , selected from the following, that complies with ANSI A118.10 and ANSI A118.12 and is recommended in writing by manufacturer for application indicated. Include reinforcement and accessories recommended in writing by manufacturer.

B. Waterproof Membrane, Sheet: Polyethylene sheet faced on one or both sides with polyester fabric.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ARDEX Americas
   b. Laticrete International, Inc.
   c. Schluter Systems L.P.

2. Nominal Thickness: 0.02 inch.

2.8 CRACK ISOLATION MEMBRANES

A. General: Manufacturer's standard product , selected from the following, that complies with ANSI A118.12 for standard performance and is recommended in writing by manufacturer for application indicated. Include reinforcement and accessories recommended in writing by manufacturer.

B. Crack Isolation Membrane, Fluid Applied: Liquid-latex rubber or elastomeric polymer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Bostik; Arkema
   b. Laticrete International, Inc.
   c. Sika Corporation

2. Reinforcement: Continuous fabric reinforcement.

2.9 SETTING MATERIALS

A. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. ARDEX Americas
   b. Laticrete International, Inc.
   c. MAPEI Corporation
   d. Siena Tile & Stone Installation Products; Omega Products International

2. Dry-Mortar Mix with Additive: Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. Dry-Mortar Mix with Liquid-Latex Additive: Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to other requirements in ANSI A118.15.

2.10 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Water-Cleanable Epoxy Grout: ANSI A118.3.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Laticrete International, Inc.
    b. MAPEI Corporation
    c. Parex, a Sika brand
    d. Sika Corporation

2. Maximum VOC Content: 65 g/L or less.
3. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

C. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.11 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting and adhesive materials for installations indicated.

B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils thick.

C. Metal Edge Trim: Profile designed for wall terminations and edge protection.

1. Profile: As indicated on Drawings.
2. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Profilitec Corp.
    b. Schluter Systems L.P.

3. Terminations: End caps Inside corners Outside corners matching edge-protection profile.
4. Material and Finish: Polished chrome anodized aluminum exposed-edge material.

D. Temporary Protective Coating: Formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products and easily removable after grouting is completed without damaging grout or tile.

E. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

F. Grout Sealer: Grout manufacturer's standard product for sealing grout joints that does not change color or appearance of grout.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove coatings, including curing compounds or other coatings, that are incompatible with tile-setting materials.

B. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended in writing by tile-setting material manufacturer.

C. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1 and is sloped 1/4 inch per foot toward drains.

D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

E. Substrate Flatness:

1. For tile shorter than 15 inches, confirm that structure or substrate is limited to variation of 1/4 inch in 10 ft. from the required plane, and no more than 1/16 inch in 12 inches

when measured from tile surface high points.

2. For large format tile, tile with at least one edge 15 inches or longer, confirm that structure or substrate is limited to 1/8 inch in 10 ft. from the required plane, and no more than 1/16 inch in 24 inches when measured from tile surface high points.

F. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION OF CERAMIC TILE SYSTEM, GENERAL

A. Tile Backing Panels: Install backing panels and treat joints in accordance with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

B. Waterproof Membranes: Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

1. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

C. Crack Isolation Membranes: Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

1. Allow crack isolation membrane to cure before installing tile or setting materials over it.

D. Setting and Grout Materials: Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

1. Add materials, water, and additives in accurate proportions.
2. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

E. Install tile in accordance with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of ANSI A108 series that are referenced in TCNA installation methods and specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

   a. Exterior tile floors and walls.
   b. Tile floors in wet areas.
   c. Tile floors consisting of tiles 8 by 8 inches or larger.

2. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint

alignments.

3. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
4. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
5. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

    a. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets, so joints between sheets are not apparent in finished Work.
    b. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
    c. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

6. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

F. Movement Joints: Provide movement joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated on Drawings. Form joints during installation of setting materials, mortar beds, and tile. Keep joints free of dirt, debris, and setting materials prior to filling with sealants. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

G. Thresholds: Install stone and solid surface thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed improved modified dry-set mortar (thinset).
2. Do not extend waterproof membrane or crack isolation membrane under thresholds set in standard dry-set mortar (thinset). Fill joints between such thresholds and adjoining tile set on waterproof membrane or crack isolation membrane with elastomeric sealant.

H. Metal Flooring Transitions: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

I. Metal Wall Trim: Install at locations indicated on Drawings.

J. Grout Sealer: Apply grout sealer to grout joints in tile floors in accordance with manufacturer's written instructions. As soon as sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 ADJUSTING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

3.5 CLEANING

A. On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile in accordance with tile and grout manufacturer's written instructions. Use only cleaners recommended in writing by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended in writing by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

D. Interior Floor Installations, Concrete Subfloor:

1. TCNA F125-Full: Thinset mortar on crack isolation membrane.
   a. Mortar:Improved modified dry-set mortar (thinset).
   b. Grout: Water-cleanable epoxy grout.
      1) Type: Unsanded.
   c. Crack Isolation Membrane: Fabric-reinforced, fluid-applied membrane.
   d. Joint Width: 1/8 inch.
   e. Movement Joints: Types located on Drawings.

E. Interior Wall Installations, Wood or Metal Studs or Furring:

1. TCNA W245: Thinset mortar on glass-mat, water-resistant gypsum backer board .
   a. Mortar: Improved modified dry-set mortar.
   b. Grout: Water-cleanable epoxy grout.
      1) Type: Unsanded.

c. Joint Width: 1/8 inch
d. Movement Joints: Types located on Drawings.

F. Shower Wall Installations:

1. TCNA B419: Thinset mortar over waterproof membrane on cement board backer board.
a. Mortar: Improved modified dry-set mortar (thinset).
b. Grout: Water-cleanable epoxy grout.

1) Type: Unsanded.

c. Waterproof Membrane: As recommended by setting material manufacturer.
d. Joint Width: 1/8 inch.
e. Movement Joints: Types located on Drawings.

END OF SECTION

SECTION 09 91 23
INTERIOR PAINTING

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

1.2 MAINTENANCE MATERIAL SUBMITTALS

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

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.3 DELIVERY, STORAGE, AND HANDLING

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

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

1.4 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

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

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each paint product from single source from single manufacturer.

B. Interior Paints: Subject to compliance with requirements, available products that may be incorporated into the Work include but are not limited to products listed in product types below and applicable interior painting schedule articles for the paint category indicated.

C. Material Compatibility:

1. Materials for use within each paint system must be 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 paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

D. Colors: As indicated in a color schedule.

2.2 PRIMERS

A. Interior Latex Primer Sealer: Pigmented, water-based latex sealer; formulated to reduce porosity of substrate for finish coats; for use on new interior plaster, concrete, and gypsum board substrates. Not intended for use on wood or previously painted surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Behr Paint Company (Behr Process LLC)
b. Benjamin Moore & Co.
c. Sherwin-Williams Company (The)

2.3 WATER-BASED FINISH COATINGS

A. Interior Latex Paint: Pigmented, water-based coating for use on interior primed/sealed plaster and gypsum board, and on primed wood and metals.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Behr Paint Company (Behr Process LLC)
b. Benjamin Moore & Co.
c. Sherwin-Williams Company (The)

2. Gloss and Sheen Level: Manufacturer's standard semigloss.

2.4 FLOOR SEALERS AND PAINTS

A. Water-Based Concrete Floor Sealer: Clear, water-based, acrylic-copolymer-emulsion sealer formulated for oil, gasoline, alkali, and water resistance and for use on concrete traffic surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Behr Paint Company (Behr Process LLC)
b. Sherwin-Williams Company (The)
c. The Pittsburgh Paints Company

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Cementitious Composition Board: 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent. Verify that finishing compound is dry and sanded smooth.

C. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

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. 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 systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

3.3 APPLICATION OF INTERIOR PAINT PRODUCTS

A. Apply paints in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or

furniture with prime coat only.

3. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
4. Primers specified in the applicable interior painting schedule articles may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.

1. Touch up and restore painted surfaces damaged by testing.
2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.
3. Cost of retesting is Contractor's responsibility.

3.5 CLEANING

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

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.

3.6 PROTECTION

A. 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 an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 INTERIOR PAINTING SCHEDULE, CONCRETE SUBSTRATES

A. Horizontal (Traffic) Surfaces:

1. Water-Based Concrete Floor Sealer System:

a. First Coat: Matching topcoat.
b. Topcoat: Water-based concrete floor sealer.

3.8 INTERIOR PAINTING SCHEDULE, GYPSUM-BASED SUBSTRATES

A. Gypsum Board and Plaster Substrates:

1. Latex over Latex Sealer System:

a. Prime Coat: Interior latex primer sealer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior latex paint.

1) Gloss and Sheen Level: Sem-Gloss

END OF SECTION

SECTION 09 93 00
STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.
2. Include preparation requirements and application instructions.
3. Indicate VOC content.

B. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

C. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.2 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: 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 gal. of each material and color applied.

1.3 DELIVERY, STORAGE, AND HANDLING

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

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

1.4 FIELD CONDITIONS

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

B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures of less than 5 deg 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

2.1 SOURCE LIMITATIONS

A. Source Limitations: Obtain each coating product from single source from single manufacturer.

2.2 STAINING AND TRANSPARENT FINISHING

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Behr Paint Company (Behr Process LLC)
2. Benjamin Moore & Co.
3. Sherwin-Williams Company (The)

B. Material Compatibility:

1. Provide materials for use within each coating 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.

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

2.3 WOOD STAINS

A. Stain, Exterior, Water Based, Semitransparent: Water-based, semitransparent, pigmented stain for new wood surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Behr Paint Company (Behr Process LLC)
b. Benjamin Moore & Co.
c. Sherwin-Williams Company (The)

B. Stain, Interior, Semitransparent, for Interior Wood: Solvent-based, oil or oil/alkyd, semitransparent, pigmented stain for new interior wood surfaces that are to be finished with a clear varnish.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Behr Paint Company (Behr Process LLC)
b. Pratt & Lambert; a subsidiary of The Sherwin-Williams Company
c. Sherwin-Williams Company (The)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements

for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Maximum Moisture Content of Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. 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.

B. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each 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.

C. 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.

D. 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 to produce smooth, glasslike finish.
3. Sand surfaces 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 dry.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions.

1. Use applicators and techniques suited for finish and substrate indicated.
2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Do not apply finishes over labels of 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.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

END OF SECTION

SECTION 10 14 23.16
ROOM-IDENTIFICATION PANEL SIGNAGE

PART 1 - GENERAL

1.1 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For room-identification signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements , including raised characters and Braille, and layout for each sign at least half size.

C. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.4 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Deterioration of finishes beyond normal weathering.
   b. Deterioration of embedded graphic image.
   c. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.2 ROOM-IDENTIFICATION SIGNS

A. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Best Sign Systems, Inc.
   b. inpro Corporation
   c. Mohawk Sign Systems
   d. Vista System, LLC

2. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet.

   a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
   b. Surface-Applied Graphics: Applied vinyl film.
   c. Color: As selected by Architect from manufacturer's full range.

3. Sign-Panel Perimeter: Finish edges smooth.

   a. Edge Condition at Horizontal Edges: Beveled.
   b. Corner Condition in Elevation: As indicated on Drawings.

4. Mounting: Manufacturer's standard method for substrates indicated with two-face tape.
5. Text and Typeface: Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color.

2.3 SIGN MATERIALS

A. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

B. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.

2. For exterior exposure, furnish nonferrous-metal or hot-dip galvanized devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:
    a. Fabricated from same basic metal and finish of fastened sign unless otherwise indicated.
4. Sign Mounting Fasteners:
    a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.
    b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.

B. Adhesive: As recommended by sign manufacturer.

C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

D. Hook-and-Loop Tape: Manufacturer's standard two-part tape consisting of hooked part on sign back and looped side on mounting surface.

E. Magnetic Tape: Manufacturer's standard magnetic tape with adhesive on one side.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

2.6 GENERAL FINISH REQUIREMENTS

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

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Accessibility: Install signs in locations on walls as indicated on Drawings.

C. Mounting Methods:

1. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
2. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
3. Hook-and-Loop Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply sign component of two-part tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage; push to engage tape adhesive. Keep tape strips 0.250 inch away from edges to prevent visibility at sign edges when sign is initially installed or reinstalled. Apply substrate component of tape to substrate in locations aligning with tape on back of sign; push and rub well to fully engage tape adhesive to substrate.

3.2 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 10 21 13.19
PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 COORDINATION

A. Coordinate requirements for overhead supports, blocking, reinforcing, and other supports concealed within wall and ceiling to ensure that toilet compartments can be supported and installed as indicated on Drawings.

1.2 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of cutouts for compartment-mounted toilet accessories.
3. Show locations of centerlines of toilet fixtures.
4. Show locations of floor drains.

C. Samples for Verification: Actual sample of finished products for each type of toilet compartment, hardware, and accessory.

1. Size: Manufacturer's standard size .

D. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

E. Delegated Design Submittals: For grab bars mounted on toilet compartment panels, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Include structural design calculations indicating compliance with specified structural-performance requirements.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For toilet compartments.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Furnish extra materials to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Door Hinges: One hinge(s) with associated fasteners.
2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
3. Door Pull: One door pull(s) with associated fasteners.
4. Fasteners: 10 fasteners of each size and type.

1.5 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain plastic toilet compartments from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire Performance: Tested in accordance with, and pass the acceptance criteria of, NFPA 286.

B. Structural Performance: Where grab bars are mounted on toilet compartments, design panels to comply with the following requirements:

1. Panels are able to withstand a concentrated load on grab bar of at least 250 lbf applied at any direction and at any point, without deformation of panel.

C. Regulatory Requirements: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1 for toilet compartments designated as accessible.

2.3 PLASTIC TOILET COMPARTMENTS

A. Solid-Plastic Toilet Compartments:

1. Basis-of-Design Product: Subject to compliance with requirements, provide ASI HDPE or comparable product by one of the following:

   a. ASI American Specialties, Inc.; ASI Group: Solid Plastic (HDPE)
   b. General Partitions Mfg. Corp
   c. Scranton Products
2. Recycled Content: Provide manufacturer documentation for recycled content, indicating postconsumer and preconsumer recycled content.
3. Toilet-Enclosure Style: Overhead braced Floor anchored .
4. Urinal-Screen Style: Wall hung .
5. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color throughout thickness of material. Provide with no-sightline system consisting of door and pilaster lapped edges on strike side of door and door and pilaster lapped edges on hinge side of door (unless continuous hinge is used).

a. Integral Hinges: Configure doors and pilasters to receive integral hinges.
b. Heat-Sink Strip: Manufacturer's continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
c. Color: One color in each room as selected by Architect from manufacturer's full range .

6. Urinal-Screen Construction: Matching panel construction.
7. Pilaster Shoes: Manufacturer's standard design; stainless steel.

a. Plastic Color: Matching pilaster.

8. Pilaster Sleeves (Caps): Manufacturer's standard design; stainless steel.

a. Plastic Color: Matching pilaster.

9. Brackets (Fittings):

a. Stirrup Type: Ear or U-brackets, stainless steel.
b. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

10. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer and fabricated from solid plastic.

2.4 HARDWARE AND ACCESSORIES

A. Door Hardware and Accessories: Manufacturer's operating hardware and accessories.

1. Hinges:

a. Manufacturer's paired, wraparound, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door.

1) Material, Paired Hinge: Aluminum.

b. Manufacturer's continuous, cam type that swings to a closed or partially open position , allowing emergency access by lifting door.

1) Material, Continuous Hinge: Stainless steel.

c. Manufacturer's integral hinge for solid-plastic doors, allowing emergency access by lifting door.

1) Material, Integral Hinge: Nylon gravity cam unit with stainless steel pins/screws.

d. Manufacturer's standard hinge.

2. Latch and Keeper: Manufacturer's surface-mounted latch unit, designed for emergency access, and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at toilet enclosures designated as accessible.

a. Material: Stainless steel.

3. Coat Hook: Manufacturer's combination hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories.

   a. Material: Stainless steel.

4. Door Bumper: Manufacturer's rubber-tipped bumper at outswinging doors.

   a. Material: Stainless steel.

5. Door Pull: Manufacturer's unit at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at toilet enclosures designated as accessible.

   a. Material: Stainless steel.

B. Door Hardware and Accessories, Heavy Duty: Manufacturer's heavy-duty institutional operating hardware and accessories.

1. Hinges: Manufacturer's minimum 0.062-inch- thick, stainless steel continuous, cam type that swings to a closed or partially open position , allowing emergency access by lifting door. Mount with through bolts.
2. Latch and Keeper: Manufacturer's heavy-duty, surface-mounted, cast stainless steel latch unit, designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at toilet enclosures designated as accessible. Mount with through bolts.
3. Coat Hook: Manufacturer's heavy-duty, combination cast stainless steel hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories. Mount with through bolts.
4. Door Bumper: Manufacturer's heavy-duty, rubber-tipped, cast stainless steel bumper at outswinging doors. Mount with through bolts.
5. Door Pull: Manufacturer's heavy-duty, cast stainless steel pull at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at toilet enclosures designated as accessible. Mount with through bolts.

C. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

D. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.5 MATERIALS

A. Aluminum Castings: ASTM B26/B26M.

B. Aluminum Extrusions: ASTM B221.

C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.

D. Stainless Steel Castings: ASTM A743/A743M.

E. Zamac: ASTM B86, commercial zinc-alloy die castings.

2.6 FABRICATION

A. Fabricate toilet compartment components to sizes indicated on drawings. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Overhead-Braced Units: Manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters and walls to suit floor and wall conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Floor-Anchored Units: Manufacturer's standard corrosion-resistant anchoring assemblies at pilasters and walls, with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

D. Ceiling-Hung Units: Manufacturer's standard corrosion-resistant anchoring assemblies at pilasters and walls, with leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.

E. Floor-and-Ceiling-Anchored Units: Manufacturer's standard corrosion-resistant anchoring assemblies at pilasters and walls, with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.

F. Urinal-Screen Posts: Manufacturer's standard corrosion-resistant anchoring assemblies at posts and walls, with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.

G. Door Size and Swings: Unless otherwise indicated on drawings, provide 24-inch- wide, inswinging doors for standard toilet enclosures and 36-inch- wide, outswinging doors with a minimum 32-inch- wide, clear opening for toilet enclosures designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF PLASTIC TOILET COMPARTMENTS

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.

1. Maximum Clearances:

   a. Pilasters and Panels or Screens: 1/2 inch.
   b. Panels or Screens and Walls: 1 inch.

2. Stirrup Brackets: Secure panels or screens to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel or screen.

   a. Locate wall brackets, so holes for wall anchors occur in masonry or tile joints.
   b. Align brackets at pilasters with brackets at walls.

3. Full-Height (Continuous) Brackets: Secure panels or screens to walls and to pilasters with full-height brackets.

   a. Locate bracket fasteners, so holes for wall anchors occur in masonry or tile joints.
   b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust, so tops of doors are parallel with overhead brace when doors are in closed position.

C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust, so tops of doors are level with tops of pilasters when doors are in closed position.

D. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust, so bottoms of doors are level with bottoms of pilasters when doors are in closed position.

E. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust, so doors are level and aligned with panels, when doors are in closed position.

F. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware in accordance with hardware

manufacturer's written instructions for proper operation. Set hinges on inswinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors to return doors to fully closed position.

END OF SECTION

SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 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.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.2 ACTION SUBMITTALS

A. Product Data: For each product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

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 accessories using designations indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Toilet-Compartment Occupancy-Indicator Systems: Manufacturer agrees to repair or replace toilet-compartment occupancy-indicator systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
2. Shower Seats: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain each type of public-use washroom accessory from single source from single manufacturer.

B. Toilet Tissue (Roll) Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ASI-American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc
   c. Bradley Corporation

2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with standard spindle.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

C. High-Speed Air Hand Dryer:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Bobrick Washroom Equipment, Inc
   b. Bradley Corporation
   c. Sloan Valve Company

d. World Dryer Corporation (Zurn Industries, LLC)

2. Description: High-speed, warm -air hand dryer for rapid hand drying.
3. Mounting: Surface mounted.

a. Protrusion Limit: Installed unit protrudes maximum 4 inches from wall surface.

4. Operation: Infrared-sensor activated with timed power cutoff switch.

a. Average Dry Time: 12 seconds.
b. Automatic Shutoff: At 60 seconds.

5. Maximum Sound Level: 69 dB.
6. Cover Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
7. Electrical Requirements: 115 V, 15 A, 1725 W.
8. Filter: HEPA, replaceable

D. Soap Dispenser:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc
c. Bradley Corporation

2. Description: Designed for manual operation and dispensing soap in liquid or lotion form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 40 oz.
5. Materials: Stainless Steel, Satin Finish.
6. Lockset: Tumbler type.
7. Refill Indicator: Window type.

E. Grab Bar:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc
c. Bradley Corporation
d. Tubular Specialties Manufacturing, Inc.

2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

a. Finish: Smooth, ASTM A480/A480M No. 4 finish .

4. OD: 1-1/2 inches.
5. Configuration and Length: As indicated on Drawings.

F. Sanitary-Napkin Disposal Unit:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ASI-American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc
   c. Bradley Corporation

2. Mounting: Surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover .
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

G. Mirror Unit:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ASI-American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc
   c. Bradley Corporation

2. Frame: Stainless steel channel.

   a. Corners: Welded and ground smooth.

3. Size: As indicated on Drawings.
4. Hangers: Manufacturer's standard rigid, tamper and theft resistant.

H. Hook:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ASI-American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc
   c. Bradley Corporation

2. Description: Double-prong unit.
3. Mounting: Concealed.
4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

2.3 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Source Limitations: Obtain each type of public-use shower room accessory from single source

from single manufacturer.

B. Shower Curtain Rod:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ASI-American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc
   c. Bradley Corporation

2. Description: 1-1/4-inch- OD, straight rod.
3. Mounting Flanges: Concealed fasteners; in material and finish matching rod.
4. Rod Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

C. Shower Curtain:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ASI-American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc
   c. Bradley Corporation

2. Size: Minimum 6 inches wider than opening by 72 inches high.
3. Material: Nylon-reinforced vinyl, minimum 9 oz. or 0.008-inch- thick vinyl, with integral antibacterial and flame-retardant agents.
4. Color: As selected from manufacturer's full range.
5. Grommets: Corrosion resistant at minimum 6 inches o.c. through top hem.
6. Shower Curtain Hooks: Chrome-plated or stainless steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

D. Folding Shower Seat:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ASI-American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc
   c. Bradley Corporation

2. Configuration: L-shaped seat, designed for wheelchair access.
3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.
4. Mounting Mechanism: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
5. Dimensions: Refer to Drawings.

E. Robe Hook:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. ASI-American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc
    c. Bradley Corporation

2. Description: Double -prong unit.
3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

2.4 CHILDCARE ACCESSORIES

A. Source Limitations: Obtain each type of childcare accessory from single source from single manufacturer.

B. Diaper-Changing Station:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. ASI-American Specialties, Inc.
    b. Bradley Corporation
    c. Diaper Deck & Co.
    d. Koala Kare Products; Bobrick Washroom Equipment, Inc.

2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.

    a. Engineered to support minimum of 250 lb static load when opened.

3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin), with replaceable insulated polystyrene tray liner and rounded plastic corners.

2.5 UNDERLAVATORY GUARDS

A. Underlavatory Guard:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Buckaroos, Inc.
    b. Plumberex Specialty Products, Inc.
    c. ProFlo; a Ferguson Enterprises, Inc. brand

2. Description: Insulating pipe covering for supply and drain piping assemblies that

prevents direct contact with and burns from piping; allow service access without removing coverings.

3. Material and Finish: Antimicrobial, molded plastic, white.

2.6 CUSTODIAL ACCESSORIES

A. Source Limitations: Obtain each type of custodial accessory from single source from single manufacturer.

B. Custodial Mop and Broom Holder:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. ASI-American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc
   c. Bradley Corporation

2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches.
4. Hooks: Four.
5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

   a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
   b. Rod: Approximately 1/4-inch- diameter stainless steel.

2.7 MATERIALS

A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.

B. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

C. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.8 FABRICATION

A. General: 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. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION OF TOILET, BATH, AND LAUNDRY ACCESSORIES

A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Remove temporary labels and protective coatings.

B. Grab Bars: Install to comply with specified structural-performance requirements.

C. Shower Seats: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION

SECTION 10 44 16
FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.

1.2 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
   b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent

testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Multipurpose Dry-Chemical Type in Steel Container : UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS

A. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

1. Mounting Height: Top of fire extinguisher to be at 42 inches above finished floor.

END OF SECTION

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product, excluding motors which are included in Part 1 of the plumbing equipment Sections.

   a. Include construction details, material descriptions, and dimensions of individual components, and finishes.
   b. Include operating characteristics and furnished accessories.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of product to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

B. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators in accordance with 2021 ASME Boiler and Pressure Vessel Code, Section IX.

1.6 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Domestic water appurtenances for plumbing piping intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act, with requirements of authorities having jurisdiction, and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. Compatibility: Provide products suitable for piping service fluids, materials, working pressures, and temperatures.

2.2 MOTORS

A. Motor Requirements, General:

1. Content includes motors for use on alternating-current power systems of up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.
2. Comply with requirements in this Section except when stricter requirements are specified in equipment schedules or Sections.
3. Comply with NEMA MG 1 unless otherwise indicated.

B. Motor Characteristics:

1. Duty: Continuous duty at ambient temperature of 105 degrees Fand at altitude of 3300 ft. above sea level.
2. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

C. Polyphase Motors:

1. Description: NEMA MG 1, Design B, medium induction motor.

2. Efficiency: Premium Efficient, as defined in NEMA MG 1.
3. Service Factor: 1.15.
4. Multispeed Motors: Variable torque.

    a. For motors with 2:1 speed ratio, consequent pole, single winding.
    b. For motors with other than 2:1 speed ratio, separate winding for each speed.
5. Rotor: Random-wound, squirrel cage.
6. Bearings: Re-greasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
7. Temperature Rise: Match insulation rating.
8. Insulation: Class F.
9. Code Letter Designation:
    a. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.

10. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

D. Additional Requirements for Polyphase Motors:

1. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
2. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

    a. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time-rise pulses produced by pulse-width-modulated inverters.
    b. Premium-Efficient Motors: Class B temperature rise; Class F insulation.
    c. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
    d. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

E. Single-Phase Motors:

1. Motors larger than 1/20 hp must be one of the following, to suit starting torque and requirements of specific motor application:

    a. Permanent-split capacitor.
    b. Split phase.
    c. Capacitor start, inductor run.
    d. Capacitor start, capacitor run.

2. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
3. Bearings: Pre-lubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
4. Motors 1/20 HP and Smaller: Shaded-pole type.

5. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device will automatically reset when motor temperature returns to normal range.

F. Electronically Commutated Motors:

1. Microprocessor-Based Electronic Control Module: Converts 120 V or 240 V single-phase AC power.
2. Three-phase power motor module with permanent magnet rotor.
3. Circuit board or digital speed controller/LED display.

2.3 SLEEVES AND SLEEVE SEALS

A. Sleeves without Waterstop:

1. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron, with plain ends.
2. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, hot-dip galvanized, with plain ends.
3. PVC Pipe Sleeves: ASTM D1785, Schedule 40.
4. Molded-PVC Sleeves: With nailing flange.

B. Sleeves with Water stop:
1. Description: Manufactured PVC/HDPE stee**l**, stainless steel or galvanized-steel, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall.

C. Sleeve-Seal Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Advance Products & Systems, Inc.
   b. CALPICO, Inc
   c. Metraflex Company (The)
   d. Proco Products, Inc
2. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

   a. Hydrostatic Seal: 20 psig minimum.
   b. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
   c. Pressure Plates: Composite plastic.
   d. Connecting Bolts and Nuts: Stainless steel, Type 316 of length required to secure pressure plates to sealing elements.

D. Grout:

1. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.

2. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
3. Design Mix: 5000 psi 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

E. Silicone Sealants:

1. Silicone Sealant, S, NS, NT: Single-component, non-sag, nontraffic-use, neutral-curing silicone joint sealant.
   a. Standard: Type S, Grade NS, Use NT.

2. Silicone Sealant, S, P, T, NT: Single-component, 100/50, pourable, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant.
   a. Standard: Type S, Grade P, Class 100/50, Uses T and NT.

2.4 ESCUTCHEONS

A. Escutcheon Types:

1. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.
2. One-Piece, Stainless Steel Type: With polished stainless steel finish.
3. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
4. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished, chrome-plated finish and spring-clip fasteners.
5. One-Piece, Stamped-Steel Type: With polished, chrome-plated finish and spring-clip fasteners.
6. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; **concealed** hinge; and spring-clip fasteners.

B. Floor Plates:

1. Split Floor Plates: Cast brass with concealed hinge.

2.5 METERS AND GAUGES FOR PLUMBING PIPING

A. Thermometers, Liquid in Glass, Lead Free - Metal Case, Industrial Style:

1. Basis- of-Design Product: Trerice #BX91 or approved equal.
2. Source Limitations: Provide liquid-in-glass, lead-free, metal-case, industrial-style thermometers from single manufacturer.
3. Standard: ASME B40.200.
4. Case: Cast aluminum; **9-inch** nominal size unless otherwise indicated.
5. Case Form: Adjustable angleunless otherwise indicated.
6. Tube: Glass with magnifying lens and blue or red organic liquid, mercury free.
7. Tube Background: Nonreflective aluminum with permanent scale markings graduated in deg F.

8. Window: acrylic plastic.
9. Stem: Aluminum and of length to suit installation.

    a. Design for Thermowell Installation: Bare stem.

10. Connector: 1-1/4 inches, with ASME B1.1 or ASME B1.20.1 screw threads to fit thermowell.
11. Accuracy: Plus or minus 1 percent of span or one scale division, to a maximum of 1.5 percent of span.

B. Thermowells, Lead Free:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: Lead-free copper.
4. Type: Stepped shank unless straight or tapered shank is indicated.
5. External Threads: NPS 1/2, NPS 3/4, or NPS 1, or as required to match threaded opening in pipe.
6. Internal Threads: Size and thread type as required to match thermometer mounting threads.
7. Bore: Diameter required to match thermometer bulb or stem.
8. Insertion Length: Length to extend to match thermometer stem length.
9. Lagging Extension: Include on thermowells for insulated piping and tubing. Extension is to be of sufficient length to extend beyond finished insulation surface.
10. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.
11. Heat-Transfer Medium: Mixture of graphite and glycerin.

C. Pressure Gauges, Dial Type, Lead Free - Direct Mounted, Metal Case:

1. Basis-of-Design Product: Trerice #620B-45
2. Source Limitations: Provide dial-type, lead-free, direct-mounted, metal-case pressure gauges from single manufacturer.
3. Standard: ASME B40.100.
4. Case: 304 stainless steel 4-1/2-inch nominal diameter.
5. Pressure-Element Assembly: Lead-free Bourdon tube.
6. Pressure Connection: Lead-free brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
7. Movement: Mechanical, with link to pressure element and connection to pointer.
8. Dial: Nonreflective aluminum with permanent scale markings graduated in psi .
9. Pointer: Dark-colored metal.
10. Window: Acrylic.
11. Ring: Stainless steel.
12. Accuracy: Grade A, plus or minus 1 percent of middle half of span.

D. Gauge Attachments, Lead Free:

1. Snubbers: ASME B40.100, lead-free brass; with NPS 1/4, ASME B1.20.1 pipe threads and porous-metal-type surge-dampening device. Include extension for use on insulated piping.
2. Valves: Lead-free brass ball, with NPS 1/4, ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES - GENERAL

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout or silicone sealant, seal the space outside of sleeves in floors/slabs/walls without sleeve-seal system. Select to maintain fire resistance of floor/slab/wall.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Seal annular space between sleeve and piping or piping insulation; use joint sealants that joint sealant manufacturer's literature indicates is appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 07 84 13 "Penetration Firestopping."

3.2 INSTALLATION OF SLEEVES WITH WATERSTOP

A. Install sleeve with water stop as new walls and slabs are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position water stop flange centered across width of concrete slab or wall.

C. Secure nailing flanges to wooden concrete forms.

D. Using grout or silicone sealant, seal space around outside of sleeves. Select to maintain fire resistance of floor/slab/wall.

3.3 INSTALLATION OF SLEEVE-SEAL SYSTEMS

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building, and passing through exterior walls.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 INSTALLATION OF ESCUTCHEONS

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

3.5 INSTALLATION OF METERS AND GAUGES

A. Install thermometer with thermowell at each required thermometer location.

B. Install thermowells in vertical position in piping tees.

C. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

D. Install thermowells with extension on insulated piping.

E. Fill thermowells with heat-transfer medium.

F. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

G. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at most readable position.

H. Install valve and snubber in piping for each pressure gauge for fluids.

I. Install thermometers in the following locations:

1. Inlet and outlet of each water heater.
2. Inlet and outlet of each domestic hot-water storage tank.
3. Each main hot-water-recirculating line return pipe.

J. Install pressure gauges in the following locations:

1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.
3. Suction and discharge of each domestic water pump.

3.6 CONNECTIONS

A. Install meters and gauges adjacent to machines and equipment to allow space for service and maintenance of meters, gauges, machines, and equipment.

3.7 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gauges to proper angle for best visibility.

3.8 FIELD QUALITY CONTROL

A. Sleeves and Sleeve Seals:

1. Perform the following tests and inspections:

a. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
b. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

2. Prepare test and inspection reports.

B. Escutcheons:

1. Using new materials, replace broken and damaged escutcheons and floor plates.

3.9 SLEEVES APPLICATION

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above and below Grade:

a. Sleeves with water stops.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

2. Concrete Slabs-on-Grade:

a. Sleeves with water stops.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Interior Wall and Partitions:

a. Sleeves without water stops.

3.10 ESCUTCHEONS APPLICATION

A. Escutcheons for New Piping and Relocated Existing Piping:

1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
2. Chrome-Plated Piping: One piece, cast brass or split-casting brass with polished, chrome-plated finish.
3. Insulated Piping:
   a. One piece, stamped steel or split plate, stamped steel with concealed hinge with polished, chrome-plated finish.

4. Bare Piping at Wall and Floor Penetrations in Finished Spaces:
   a. One piece, cast brass with polished, chrome-plated finish.

5. Bare Piping at Ceiling Penetrations in Finished Spaces:
   a. One piece, cast brass with polished, chrome-plated finish.

6. Bare Piping in Unfinished Service Spaces:
   a. One piece, stamped steel or split plate, stamped steel with concealed hinge with polished, chrome-plated finish.

7. Bare Piping in Equipment Rooms:
   a. One piece, stamped steel or split plate, stamped steel with concealed hinge with polished, chrome-plated finish.

B. Install floor plates for piping penetrations of equipment-room floors.

C. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping and Relocated Existing Piping: One piece, floor plate.
2. Existing Piping: Split floor plate.

3.11 THERMOMETER, LEAD FREE, APPLICATION

A. Thermometers at inlet and outlet of each domestic water heater are to be the following:
   1. Metal case, industrial-style, liquid-in-glass type.

B. Thermometers at inlet and outlet of each domestic hot-water storage tank are to be the following:
   1. Metal case, industrial-style, liquid-in-glass type.

C. Thermometer stems are to be of length to match thermowell insertion length.

3.12 THERMOMETER, LEAD FREE, SCALE-RANGE APPLICATION

A. Scale Range for Domestic Cold-Water Piping:

   1. 0 to 100 deg F

B. Scale Range for Domestic Hot-Water Piping:
   1. 30 to 240 deg F.

3.13 PRESSURE-GAUGE APPLICATION

A. Pressure gauges at discharge of each water service into building are to be the following:

   1. Direct mounted, metal case.

B. Pressure gauges at inlet and outlet of each water pressure-reducing valve are to be the following:

   1. Direct mounted, metal case.

C. Pressure gauges at suction and discharge of each domestic water pump are to be the following:

   1. Direct mounted, metal case.

3.14 PRESSURE-GAUGE SCALE-RANGE APPLICATION

A. Scale Range for Water Service Piping:
   1. 0 to 160 psi.

B. Scale Range for Domestic Water Piping:
   1. 0 to 160 psi.

END OF SECTION

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene-diene terpolymer.

C. FKM: Fluoroelastomer.

D. NBR: Nitrile butadiene rubber (also known as Buna-N).

E. PTFE: Polytetrafluoroethylene.

F. RPTFE: Reinforced polytetrafluoroethylene.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

   a. Include material descriptions and dimensions of individual components.
   b. Include operating characteristics and furnished accessories.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads and solder ends.
3. Set ball valves open to minimize exposure of functional surfaces.
4. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Standards:

1. Domestic-water piping valves intended to convey or dispense water for human consumption must comply with the U.S. Safe Drinking Water Act (SDWA), requirements of authorities having jurisdiction, and NSF 61/NSF 372; or to be certified in compliance with NSF 61/NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.18 for cast-copper solder-joint connections.
3. ASME B16.22 for wrought-copper solder-joint connections.
4. ASME B31.9 for building services piping valves.

C. Provide bronze valves made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are unacceptable.

D. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream piping unless otherwise indicated.

F. Valve Bypass and Drain Connections: MSS SP-45.

G. Valve Actuator Type:
1. Hand Lever: For quarter-turn ball valves smaller than NPS 4.

H. Valves in Insulated Piping:

1. Provide 2-inch extended neck stems.
2. Provide extended operating handles with nonthermal-conductive covering material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Provide memory stops that are fully adjustable after insulation is applied.

2.3 BALL VALVES, LEAD FREE

A. Ball Valves, Lead Free, Threaded or Soldered Ends - Brass, Two Piece with Full Port and Brass Trim:
   1. Standards: MSS SP-110 and MSS SP-145.
   2. CWP Rating: 600 psig.
   3. Body Design: Two piece.
   4. Body Material: Forged brass.
   5. Ends: Threaded or soldered. See Part 3 ball valve schedule articles.
   6. Seats: PTFE.
   7. Stem: Brass.
   8. Ball: Chrome-plated brass.
   9. Port: Full.

B. Ball Valves, Lead Free, Threaded or Soldered Ends - Brass, Three Piece with Full Port and Brass Trim:
   1. Standards: MSS SP-110 and MSS SP-145.
   2. CWP Rating: 600 psig.
   3. Body Design: Three piece.
   4. Body Material: Forged brass.
   5. Ends: Threaded or soldered. See Part 3 ball valve schedule articles.
   6. Seats: PTFE.
   7. Stem: Brass.
   8. Ball: Chrome-plated brass.
   9. Port: Full.

C. Ball Valves, Lead Free, Threaded or Soldered Ends - Bronze, Two Piece with Full Port and Bronze or Brass Trim:
   1. Standards: MSS SP-110 and MSS SP-145.
   2. CWP Rating: 600 psig.
   3. Body Design: Two piece.
   4. Body Material: Bronze.
   5. Ends: Threaded or soldered. See Part 3 ball valve schedule articles.
   6. Seats: PTFE.
   7. Stem: Bronze or brass.
   8. Ball: Chrome-plated brass.
   9. Port: Full.

D. Ball Valves, Lead Free, Threaded Ends - Bronze, Three Piece with Full Port and Bronze or Brass Trim:
   1. Standards: MSS SP-110 and MSS SP-145.
   2. CWP Rating: 600 psig.
   3. Body Design: Three piece.
   4. Body Material: Bronze.
   5. Ends: Threaded.
   6. Seats: PTFE.
   7. Stem: Bronze or brass.
   8. Ball: Chrome-plated brass.

9. Port: Full.

2.4 CHECK VALVES, LEAD FREE

A. Check Valves, Lead Free, Swing Type, Threaded or Soldered Ends - Bronze, with Bronze Disc, Class 125:
   1. Standard: MSS SP-80, Type 3.
   2. CWP Rating: 200 psig.
   3. Body Design: Horizontal flow.
   4. Body Material: ASTM B62, bronze.
   5. Ends: Threaded or soldered. See Part 3 check valve schedule articles.
   6. Disc: Bronze.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Do not attempt to repair defective valves; replace with new valves. Remove defective valves from site.

3.2 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Provide support of piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access and where not blocked by equipment, other piping, or building components.

D. For valves in horizontal piping, install valves with stem at or above center of pipe.

E. Install valves in position that does not project into aisles or block access to other equipment.

F. Install valves in position to allow full stem and actuator or manual operator movement.

G. Verify that joints of each valve have been properly installed and sealed to assure there is no leakage or damage.

H. Install check valves for proper direction of flow and as follows:
   1. Check Valves, Swing Type: In horizontal position with hinge pin level.

I. Valve Tags: Comply with requirements in Section 22 05 53 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

J. Adhere to manufacturer's written installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve manufacturer's written recommended maximum.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. Select valves with the following end connections:

   1. For Copper Tubing, NPS 3 and Smaller: Threaded ends except where solder-joint valve-end option or press-end option is indicated in valve schedules below.

3.5 DOMESTIC HOT- AND COLD-WATER BALL VALVE SCHEDULE

A. Pipe NPS 3 and Smaller:
   1. Ball valves, lead free, threaded or soldered ends - brass, two piece with full port and brass trim.
   2. Ball valves, lead free, threaded or soldered ends - brass, three piece with full port and brass trim.
   3. Ball valves, lead free, threaded or soldered ends - bronze, two piece with full port and bronze or brass trim.
   4. Ball valves, lead free, threaded ends - bronze, three piece with full port and bronze or brass trim.

3.6 DOMESTIC HOT- AND COLD-WATER CHECK VALVE SCHEDULE

A. Pipe NPS 3 and Smaller:

1. Check valves, lead free, swing type, threaded or soldered ends - bronze, with bronze disc, Class 125.

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.2 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.3 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for plumbing piping and equipment are to withstand the effects of gravity loads and stresses within limits and under conditions indicated in accordance with ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 PIPE HANGERS AND SUPPORTS - METAL

A. Pipe Hangers and Supports - Carbon Steel:
1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated or epoxy powder coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Pipe/Tube Hangers and Supports - Copper:
   1. Description: MSS SP-58, Types 1 through 58, copper-plated-steel, factory-fabricated components.
   2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-plated steel.

2.3 PIPE HANGERS - METAL, TRAPEZE TYPE

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 STRUT SUPPORT SYSTEMS - METAL

A. Strut Support System - Metal, Rod Type:
   1. Description: Factory-fabricated pipe-support assembly, made of steel channels, vertical metal support rods, accessories, fittings, and other components for supporting multiple parallel pipes.
   2. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
   3. Struts: Continuous slotted carbon-steel.
   4. Strut Width: Selected for applicable load criteria.
   5. Strut Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
   6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
   7. Metallic Coating: Electroplated zinc.

2.5 THERMAL HANGER SHIELD INSERTS

A. Thermal Hanger Shield Inserts:
   1. Insulation-Insert Material for Hot Piping: Water-repellent-treated, ASTM C533, Type I calcium silicate with 100 psig ASTM C552, Type II cellular glass with 100 psig or ASTM C591, Type VI, Grade 1 polyisocyanurate with 125 psig minimum compressive strength.
   2. For Trapeze or Clamped Systems: Insert and shield are to cover entire circumference of pipe.
   3. For Clevis or Band Hangers: Insert and shield are to cover bottom 180 degrees of pipe.
   4. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Fastener System - Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities required for supported loads and building materials where used.

B. Fastener System - Mechanical-Expansion Anchors: Insert-wedge-type anchors, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities required for supported loads and building materials where used.
   1. Indoor Applications: Zinc-plated or stainless steel.
   2. Outdoor Applications: Stainless steel.

2.7 PIPE-POSITIONING SYSTEMS

A. Description: IAPMO PS 42 positioning system composed of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-carbon-steel shapes.

2.9 MATERIALS

A. Aluminum: ASTM B221.

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A36/A36M carbon-steel plates, shapes, and bars; black and galvanized.

D. Stainless Steel: ASTM A240/A240M.

E. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

   1. Properties: Nonstaining, noncorrosive, and nongaseous.
   2. Design Mix: 5000 psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination is to include weight of supported components plus 200 lb.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

A. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

B. Install lateral bracing with pipe hangers and supports to prevent swaying.

C. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2and larger and at changes in direction of piping. Coordinate location of concrete inserts before concrete is placed.

D. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

E. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

F. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields are to span an arc of 180 degrees.

3. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.

G. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

H. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.

2. Field fabricate in accordance with ASTM A36/A36M carbon-steel shapes selected for loads being supported. Weld steel in accordance with AWS D1.1/D1.1M.

I. Strut System Installation: Metal, rod type; arrange for grouping of parallel runs of piping, and support together on field-assembled strut systems. Install in accordance with manufacturer's written installation instructions.

J. Thermal Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

K. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick after concrete is placed and cured. Use installers that are licensed by powder-actuated tool manufacturer.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners in accordance with manufacturer's written instructions.
3. Install lag screw wood fasteners in accordance with manufacturer's written instructions.
4. Install fasteners in accordance with manufacturer's written instructions.

L. Pipe Stand Installation:

1. Pipe Stand Types, except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

M. Pipe-Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

N. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

O. Equipment Support Installation:

1. Fabricate from welded-structural-steel shapes.
2. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
3. Grouting: Place grout under supports for floor-mounted equipment and make bearing surface smooth.
4. Provide lateral bracing, to prevent swaying.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup:

1. Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

   a. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
2. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use stainless steel pipe hangers and stainless steel attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
3. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
4. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
5. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
6. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
7. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
8. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
9. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
10. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
2. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
   2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
   3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
   4. C-Clamps (MSS Type 23): For structural shapes.
   5. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
   6. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
   7. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

      a. Light (MSS Type 31): 750 lb.

   8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
   9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
   10. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

   1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
   2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
   3. Thermal Hanger Shield Inserts: For supporting insulated pipe.

O. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

Q. Use pipe-positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment-Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve-numbering scheme.

E. Valve Schedules: For each piping system. Include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.
2. Letter and Background Color: As indicated for specific application under Part 3.
3. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
6. Fasteners: Stainless steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.

B. Letter and Background Color: As indicated for specific application under Part 3.

C. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.

D. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

E. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

F. Fasteners: Stainless steel rivets or self-tapping screws.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 WARNING TAPE

A. Material: Vinyl.

B. Minimum Thickness: 0.005 inch.

C. Letter, Pattern, and Background Color: As indicated for specific application under Part 3.

D. Waterproof Adhesive Backing: Suitable for indoor or outdoor use.

E. Maximum Temperature: 160 deg F.

F. Minimum Width: 2 inches.

2.4 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color coded, with lettering indicating service and showing flow direction in accordance with ASME A13.1.

B. Letter and Background Color: As indicated for specific application under Part 3.

C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings. Also include:

1. Pipe size.
2. Flow-Direction Arrows: Include flow-direction arrows on distribution piping. Arrows may be either integral with label or applied separately.
3. Lettering Size: At least 1/2 inch for viewing distances of up to 72 inches and proportionately larger lettering for greater viewing distances.

2.5 VALVE TAGS

A. Description: Stamped or engraved with 1/4-inchletters for piping system abbreviation and 1/2-inchnumbers.

1. Tag Material: Brass, 0.04-inch minimum thickness, with predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass S-hook.

B. Letter and Background Color: As indicated for specific application under Part 3.

C. Valve Schedules: For each piping system, on 8-1/2-by-11-inchbond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Include valve-tag schedule in operation and maintenance data.

2.6 WARNING TAGS

A. Description: Preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption, such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Letter and Background Color: As indicated for specific application under Part 3.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 INSTALLATION, GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.3 INSTALLATION OF EQUIPMENT LABELS, WARNING SIGNS, AND LABELS

A. Permanently fasten labels on each item of plumbing equipment.

B. Sign and Label Colors.

1. White letters on an ANSI Z535.1 safety-green background.

C. Locate equipment labels where accessible and visible.

3.4 INSTALLATION OF WARNING TAPE

A. Warning Tape Color and Pattern: Yellow background with black diagonal stripes.

B. Install warning tape on pipes, with cross-designated walkways providing less than 6 ft. of clearance.

C. Locate tape so as to be readily visible from the point of normal approach.

3.5 INSTALLATION OF PIPE LABELS

A. Install pipe labels showing service and flow direction with permanent adhesive on pipes.

B. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Within 3 ft. of each valve and control device.
2. At access doors, manholes, and similar access points that permit view of concealed piping.
3. Within 3 ft. of equipment items and other points of origination and termination.
4. Spaced at maximum intervals of 25 ft. along each run. Reduce intervals to 10 ft.in areas of congested piping and equipment.

C. Do not apply plastic pipe labels or plastic tapes directly to bare pipes conveying fluids at temperatures of 125 deg For higher. Where these pipes are to remain uninsulated, use a short section of insulation or use stenciled labels.

D. Flow-Direction Flow Arrows: Use arrows, in compliance with ASME A13.1, to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

E. Pipe-Label Color Schedule:
1. Domestic Cold-Water Piping: White letters on an ANSI Z535.1 safety-green background.
2. Domestic Hot-Water Piping: White letters on an ANSI Z535.1 safety-green background**.**
3. Domestic Hot-Water Return Piping White letters on an ANSI Z535.1 safety-green background.
4. Sanitary Waste Piping: White letters on a black background.

3.6 INSTALLATION OF VALVE TAGS

A. Install 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 similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule in the operating and maintenance manual.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below:

1. Valve-Tag Size and Shape:

a. Domestic Cold Water: 1-1/2 inches round.
b. Domestic Hot Water: 1-1/2 inches round.
c. Domestic Hot-Water Return: 1-1/2 inches round.

2. Valve-Tag Colors:

a. For each piping system, use the same lettering and background coloring system on valve tags as used in the piping system labels and background.

3.7 INSTALLATION OF WARNING TAGS

A. Warning Tag Color: Black letters on an ANSI Z535.1 safety-yellow background.

B. Attach warning tags, with proper message, to equipment and other items.

END OF SECTION

SECTION 22 05 93

TESTING, ADJUSTING, AND BALANCING FOR PLUMBING

PART 1 - GENERAL

1.1 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

F. TDH: Total dynamic head.

1.2 INFORMATIONAL SUBMITTALS

A. Sample report forms.

B. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of calibration.

1.3 QUALITY ASSURANCE

A. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

B. ASHRAE 111 Compliance: Requirements in ASHRAE 111 applicable to analogous domestic water system and plumbing equipment balancing.

C. ASHRAE 188 Compliance: Comply with balancing and report requirements, Section 8.3 "Balancing."

D. Code and Authorities Having Jurisdiction Compliance: TAB is required to comply with governing codes and requirements of authorities having jurisdiction.

1.4 FIELD CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, and balancing valves and fittings. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine approved submittals for plumbing systems and equipment.

D. Examine design data, including plumbing system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about plumbing system and equipment controls.

E. Examine equipment performance data, including pump curves.

1. Relate performance data to Project conditions and requirements, including pump system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

F. Examine system and equipment installations, and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine temporary and permanent strainers. Verify that temporary strainer screens used during system cleaning and flushing have been removed and permanent strainers are installed and clean.

I. Examine control valves for proper installation for their intended function of isolating, throttling, diverting, or mixing fluid flows.

J. Examine system pumps to ensure absence of entrained air in the suction piping.

K. Examine operating safety interlocks and controls on plumbing equipment.

L. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Perform system-readiness checks of plumbing systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Domestic Water System:

   a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed in accordance with applicable code and authority having jurisdiction.
   b. Water heaters are installed and functioning.
   c. Piping is complete and all points of outlet are installed.
   d.
   e. Systems are flushed, filled, and air purged.
   f. Strainers are clean.
   g. Control valves are functioning in accordance with the sequence of operation.
   h. Shutoff and balance valves are 100 percent open.
   i. t-water circulating pumps are operational and proper rotation is verified.
   j. Pump gauge connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
   k. Suitable access to balancing devices and equipment is provided.

2. Sanitary Sewage/Drainage System:

   a. Leakage and pressure tests on sanitary sewage/drainage systems have been completed in accordance with applicable code and authority having jurisdiction requirements.
   b. Piping is complete.
   c. Sanitary sewage pumps/drainage pumps are operational.
   d. Suitable access to equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system in accordance with the procedures contained in ASHRAE 111and in this Section.

B. Cut insulation, pipes, and equipment casings for installation of test probes to the minimum extent necessary for TAB procedures.

1. Where holes for probes are required in piping or equipment, install pressure and temperature test plugs to seal systems.

2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish in accordance with Section 22 07 16 "Plumbing Equipment Insulation" and Section 22 07 19 "Plumbing Piping Insulation."

C. Mark equipment and balancing devices, including valve position indicators and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

3.4 GENERAL PROCEDURES FOR PLUMBING EQUIPMENT

A. Test, adjust, and balance plumbing equipment indicated on Drawings, including, but not limited to, the following:

1. Motors.
2. Domestic water in-line pumps.
3. Domestic water heaters.

3.5 PROCEDURES FOR DOMESTIC WATER SYSTEMS

A. Prepare test reports for pumps and other equipment. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required equipment flow rates with system design flow rates.

B. Prepare schematic diagrams of systems' Record drawings piping layouts.

C. In addition to requirements in "Preparation" Article, prepare domestic water systems for testing and balancing as follows:

1. Check expansion tank for proper setting.
2. Check water heater for proper discharge temperature setting.
3. Check remotest point of outlet for adequate pressure.
4. Check flow-control valves for proper position.
5. Locate start-stop and disconnect switches, electrical interlocks, and motor controllers.
6. Verify that motor controllers are equipped with properly sized thermal protection.
7. Check that air has been purged from the system.

D. Measure and record upstream and downstream pressure of each piece of equipment.

E. Check settings and operation of automatic temperature-control valves. Record final settings.

F. Check settings and operation of each safety valve. Record settings.

3.6 PROCEDURES FOR DOMESTIC HOT-WATER CIRCULATING INLINE PUMP

A. Balance system with manual or automatic balancing valves by setting at design flow.

1. Measure flow in main and branch pipes.
2. Adjust main and branch balance valves for design flow.
3. Re-measure each main and branch after all have been adjusted.

B. Adjust pump to deliver total design flow.

1. Measure pump TDH as follows:

   a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
   b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
   c. Convert pressure to head and correct for differences in gauge heights.
   d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.

2. Monitor motor performance during procedures, and do not operate motor in an overloaded condition.
3. Mark final settings and verify that all memory stops have been set.
4. Verify final system conditions as follows:

   a. Re-measure and confirm that total flow is within design.
   b. Re-measure final pumps' operating data, TDH, volts, amps, speed, and static profile.
   c. Mark final settings.

3.7 PROCEDURES FOR MOTORS

A. Motors: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

3.8 PROCEDURES FOR WATER HEATERS

A. Electric Water Heaters:

1. Measure and record entering- and leaving-water temperatures.
2. Measure and record water flow.
3. Measure and record pressure drop.

4. Record relief valve(s) pressure setting.
5. Capacity: Calculate in Btu/h (kW) of heating output.
6. Efficiency: Calculate operating efficiency for comparison to submitted equipment.

3.9 TOLERANCES

A. Set plumbing system's flow rates within the following tolerances:

1. Domestic Water Flow Rate: Plus or minus 10 percent. If design value is less than 10 gpm, within 10 percent.

3.10 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for system-balancing devices. Recommend changes and additions to system-balancing devices, to facilitate proper performance measuring and balancing. Recommend changes and additions to plumbing systems and general construction to allow access for performance-measuring and -balancing devices.

3.11 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.

7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents, including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Notes to explain why certain final data in the body of reports vary from indicated values.
14. Test conditions for pump performance forms, including the following:

    a. Variable-frequency controller settings for variable-flow hydronic systems.
    b. Settings for pressure controller(s).
    c. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of distribution systems. Present each system with single-line diagram and include the following:

1. Flow rates.
2. Pipe and valve sizes and locations.
3. Balancing stations.
4. Position of balancing devices.

E. Electric Water Heater Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

    a. System identification.
    b. Location.
    c. Model number and unit size.
    d. Manufacturer's serial number.
    e. Output capacity in Btu/h (kW).
    f. Number of stages.
    g. Connected volts, phase, and hertz.
    h. Rated amperage.

2. Test Data (Indicated and Actual Values):

    a. Heat output in Btu/h (kW).
    b. Entering-water temperature in deg F.
    c. Leaving-water temperature in deg F.
    d. High-temperature-limit setting in deg F.
    e. Operating set point in deg F.

f. Voltage at each connection.
g. Amperage for each phase.

F. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves, and include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm.
g. Water-pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump speed.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

a. Static head in feet of head or psig.
b. Pump shutoff pressure in feet of head or psig.
c. Actual impeller size in inches.
d. Full-open flow rate in gpm.
e. Full-open pressure in feet of head or psig.
f. Final discharge pressure in feet of head or psig.
g. Final suction pressure in feet of head or psig.
h. Final total pressure in feet of head or psig.
i. Final water flow rate in gpm.
j. Voltage at each connection.
k. Amperage for each phase.

G. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.12 VERIFICATION OF TAB REPORT

A. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

B. If the number of "FAILED" measurements is greater than 10percent of the total measurements checked during the final inspection, the TAB shall be considered incomplete and shall be rejected.

C. If recheck measurements find the number of failed measurements noncompliant with requirements indicated, proceed as follows:

1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection. All changes shall be tracked to show changes made to previous report.
2. If the second final inspection also fails, Owner may pursue other Contract options to complete TAB work.

D. Prepare test and inspection reports.

END OF SECTION

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

1.2 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation system materials are to be delivered to the Project site in unopened containers. The packaging is to include name of the manufacturer, fabricator, type, description, and size[**, as well as ASTM standard designation and maximum use temperature**].

1.5 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application.

C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," articles for where insulating materials are applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

E. Flexible Elastomeric: Closed-cell or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F and 220 deg F. Comply with ASTM C534/C534M, Type I for tubular materials.

F. Glass-Fiber, Preformed Pipe: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 850 deg F in accordance with ASTM C411. Comply with ASTM C547.
1. Preformed Pipe Insulation: Type I, Grade A with factory-applied ASJ-SSL.
2. Fabricated shapes in accordance with ASTM C450 and ASTM C585.
3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

G. Mineral Wool, Preformed Pipe: Mandrel-wound mineral wool fibers bonded with a thermosetting resin, unfaced; suitable for maximum use temperature up to 1200 deg F in accordance with ASTM C447. Comply with ASTM C547.
1. Preformed Pipe Insulation: Type II, Grade A with factory-applied ASJ-SSL.

2. Fabricated shapes in accordance with ASTM C450 and ASTM C585.

2.3 INSULATING CEMENTS

A. Glass-Fiber and Mineral Wool Insulating Cement: Comply with ASTM C195.

B. Glass-Fiber and Mineral Wool Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C449.

2.4 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Solvent-based adhesive.
1. Flame-spread index is 25 or less and smoke-developed index is 50 or less as tested in accordance with ASTM E84.
2. Wet Flash Point: Below 0 deg F.
3. Service Temperature Range: 40 to 200 deg F.
4. Color: Black.

C. Glass-Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

D. ASJ Adhesive and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A, for bonding insulation jacket lap seams and joints.

E. PVC Jacket Adhesive: Compatible with PVC jacket.

2.5 MASTICS AND COATINGS

A. Materials are compatible with insulation materials, jackets, and substrates.

B. Vapor-Retarder Mastic, Water Based: Suitable for indoor use on below-ambient services.
1. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Comply with MIL-PRF-19565C, Type II, for permeance requirements.
4. Color: White.

2.6 LAGGING ADHESIVES

A. Adhesives comply with MIL-A-3316C, Class I, Grade A, and are compatible with insulation materials, jackets, and substrates.
1. Fire-resistant, water-based lagging adhesive and coating for use indoors to coat exposed edges of pipe insulation.
2. Service Temperature Range: 0 to plus 180 deg F.

3. Color: White.

2.7 SEALANTS

A. Materials are as recommended by the insulation manufacturer and are compatible with insulation materials, jackets, and substrates.

B. Joint Sealants:
   1. Permanently flexible, elastomeric sealant.
   2. Service Temperature Range: Minus 58 to plus 176 deg F.
   3. Color: White or gray.

C. ASJ Flashing Sealants and PVC Jacket Flashing Sealants:
   1. Fire- and water-resistant, flexible, elastomeric sealant.
   2. Service Temperature Range: Minus 40 to plus 250 deg F.
   3. Color: White.

2.8 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

   1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
   2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C1136, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
   1. Adhesive: As recommended by jacket material manufacturer.
   2. Color: White.
   3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

      a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.10 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Mesh: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in.for covering pipe and pipe fittings.

B. Woven Polyester Mesh: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.

2.11 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Cloth: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..

2.12 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.
   1. Width: 3 inches.
   2. Thickness: 11.5 mils.
   3. Adhesion: 90 ounces force/inch in width.
   4. Elongation: 2 percent.
   5. Tensile Strength: 40 lbf/inch in width.
   6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. F

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
   1. Width: 2 inches.
   2. Thickness: 6 mils.
   3. Adhesion: 64 ounces force/inch in width.
   4. Elongation: 500 percent.
   5. Tensile Strength: 18 lbf /inch in width.

2.13 SECUREMENTS

A. Bands:
   1. Stainless Steel: ASTM A240/A240M, Type 304; 0.015 inch thick, 1/2 inchwide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

2.14 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:
1. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.

D. Install insulation with longitudinal seams at top and bottom (12 o'clock and 6 o'clock positions) of horizontal runs.

E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

F. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with Contract Documents.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 4 inches o.c.

   a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least **4 inches** beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

O. For above-ambient services, do not install insulation to the following:
   1. Testing agency labels and stamps.
   2. Nameplates and data plates.
   3. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

   1. Seal penetrations with flashing sealant.
   2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant.
   3. Seal jacket to wall flashing with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

   1. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

D. Insulation Installation at Floor Penetrations:

   1. Pipe: Install insulation continuously through floor penetrations.
   2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles below.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:

   1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation made from same material and density as that of adjacent pipe insulation. Each piece is butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges, mechanical couplings, and unions, using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.
7. For services not specified to receive a field-applied jacket, except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as that of pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install sections of pipe insulation and miter if required in accordance with manufacturer's written instructions.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated valve covers manufactured of same material as that of pipe insulation when available.
2. When prefabricated valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 INSTALLATION OF GLASS-FIBER AND MINERAL WOOL INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with glass-fiber or mineral-wool blanket insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When prefabricated insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When prefabricated sections are not available, install fabricated sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 INSTALLATION OF FIELD-APPLIED JACKETS

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inchoverlap at seams and joints.
2. Embed glass cloth between two 0.062-inch-thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where PVC jackets are indicated, install with 1-inchoverlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.9 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1 1/4and Smaller: Insulation is one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
   c. Mineral Wool, Preformed Pipe Insulation, Type II: 1 inch thick.

2. NPS 1-1/2 and Larger: Insulation is one of the following:
   a. Flexible Elastomeric: 1 1/2 inch thick.
   b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1 1/2 inch thick.
   c. Mineral Wool, Preformed Pipe Insulation, Type II: 1 1/2 inch thick.

B. Domestic Hot and Recirculated Hot Water:

1. NPS 1-1/4and Smaller: Insulation is one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
   c. Mineral Wool, Preformed Pipe Insulation, Type II: 1 inch thick.

2. NPS 1-1/2and Larger: Insulation is one of the following:
   a. Flexible Elastomeric: 1 1/2 inch thick.
   b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1 1/2 inch thick.
   c. Mineral Wool, Preformed Pipe Insulation, Type II: 1 1/2 inch thick.

C. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Provide premanufactured P-Trap and supply covers or protective shield enclosure.

D. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation is one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
   c. Mineral Wool, Preformed Pipe Insulation, Type II: 1 inch thick.

3.12 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. None.
2. PVC: 20 mils thick.

END OF SECTION

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Domestic water piping, tubing, fittings, joints, and appurtenances intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act, with requirements of authorities having jurisdiction, and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 PIPING MATERIALS

A. Potable-water piping and components are to comply with NSF 14, NSF 61, and NSF 372. Include marking "NSF-pw" on piping.

2.3 COPPER TUBE AND FITTINGS - DOMESTIC WATER

A. Drawn-Temper Copper Tube: ASTM B88, Type L.

B. Annealed-Temper Copper Tube: ASTM B88, Type K.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings. Do not use solder joints on pipe sizes greater than NPS 4.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, pressure fittings. Do not use solder joints on pipe sizes greater than NPS 4.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Do not use solder joints on pipe sizes greater than NPS 4.

F. Cast Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends. Do not use solder joints on pipe sizes greater than NPS 4.

G. Wrought Copper Unions: ASME B16.22. Do not use solder joints on pipe sizes greater than NPS 4.

H. Grooved, Mechanical-Joint, Copper Tube Appurtenances - Domestic Water:

1. Source Limitations: Obtain grooved, mechanical-joint copper tube appurtenances from single manufacturer.
2. Grooved-End, Copper Fittings: ASTM B75/B75M copper tube or ASTM B584 bronze castings.
3. Grooved-End-Tube Couplings: To fit copper-tube dimensions; rigid pattern unless otherwise indicated; gasketed fitting, EPDM-rubber gasket, UL classified per NSF 61 and NSF 372, and rated for minimum 180 deg F, for use with ferrous housing and steel bolts and nuts; 300 psig minimum CWP pressure rating.

I. Pressure-Seal-Joint Fittings, Copper or Bronze - Domestic Water:
1. Source Limitations: Obtain pressure-seal-joint fittings, copper or bronze, from single manufacturer.
2. Housing: Copper.
3. O-Rings and Pipe Stops: EPDM.
4. Tools: Manufacturer's special tools.
5. Minimum 200 psig working-pressure rating at 250 deg F.

2.4 PIPING JOINING MATERIALS - DOMESTIC WATER

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B32, lead-free alloys.

D. Flux: ASTM B813, water flushable.

E. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.5 DIELECTRIC FITTINGS - DOMESTIC WATER

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions - Domestic Water:
   1. Source Limitations: Obtain dielectric unions from single manufacturer.
   2. Standard: ASSE 1079.
   3. Pressure Rating: 125 psig minimum at 180 deg F.
   4. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges - Domestic Water:
   1. Source Limitations: Obtain dielectric flanges from single manufacturer.
   2. Standard: ASSE 1079.
   3. Factory-fabricated, bolted, companion-flange assembly.
   4. Pressure Rating: 125 psig minimum at 180 deg F.
   5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits - Domestic Water:
   1. Source Limitations: Obtain dielectric-flange insulating kits from single manufacturer.
   2. Nonconducting materials for field assembly of companion flanges.
   3. Pressure Rating: 150 psig.
   4. Gasket: Phenolic, Temperature Rating: 225 deg F.
   5. Bolt Sleeves: Phenolic or polyethylene.
   6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples - Domestic Water:
   1. Source Limitations: Obtain dielectric nipples from single manufacturer.
   2. Standard: IAPMO PS 66.
   3. Electroplated steel nipple complying with ASTM F1545.
   4. Pressure Rating and Temperature: 300 psig at 225 deg F.
   5. End Connections: Male threaded or grooved.
   6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Under-building-slab, domestic water, building-service piping, NPS 3 and smaller is to be the following:

1. Annealed-temper copper tube, ASTM B88, Type K; wrought-copper, solder-joint fittings; and brazed joints.

D. Aboveground domestic water piping, NPS 2 and smaller is to be the following:
   1. Drawn-temper copper tube, ASTM B88, Type L; cast or wrought copper, solder-joint fittings; and soldered joints.
   2. Drawn-temper copper tube, ASTM B88, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.

3.2 EARTHWORK

A. Comply with requirements in Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling.

3.3 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab in accordance with CDA's "Copper Tube Handbook."

C. Install valves in accordance with Section 22 05 23 "General-Duty Valves for Plumbing Piping."

D. Install domestic water piping with 0.25 percent slope downward toward drain and plumb.

E. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

H. Install piping to permit valve servicing.

I. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

J. Install piping free of sags and bends.

K. Install fittings for changes in direction and branch connections.

L. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

M. Install pressure gauges on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gauges in Section 22 05 00 "Common Work Results for Plumbing."

N. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 22 11 23.21 "Inline, Domestic Water Pumps."

O. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 22 05 00 "Common Work Results for Plumbing."

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 05 00 "Common Work Results for Plumbing."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 22 05 00 "Common Work Results for Plumbing."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 05 00 "Common Work Results for Plumbing."

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings in accordance with ASTM B828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools and procedure recommended by pressure-seal-fitting manufacturer. Leave insertion marks on pipe after assembly.

G. Joint Construction for Grooved-End Copper Tubing: Make joints in accordance with AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.

H. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts in accordance with ASME B31.9.

I. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.5 INSTALLATION OF DIELECTRIC FITTINGS

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges or flange kits.

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for hangers, supports, and anchor devices in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."

B. Install hangers for copper and tube and pipe, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

C. Support horizontal piping within 12 inches of each fitting.

D. Support vertical runs of copper and tube and pipe to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.7 PIPING CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2and larger.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system in accordance with 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 allow to 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 three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to achieve adequate flow.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Piping Inspections:

    a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
    b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

        1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after installation and before setting fixtures.
        2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

    c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
    d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

    a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
    b. 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 a separate report for each test, complete with diagram of portion of piping tested.

c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. 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 it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION

SECTION 22 11 19

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 DEFINITIONS

A. AMI: Advanced Metering Infrastructure.

B. AMR: Automatic Meter Reading.

C. FKM: A family of fluoroelastomer materials defined by ASTM D1418.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Domestic water piping specialties intended to convey or dispense water for human consumption are to comply with the SDWA, requirements of authorities having jurisdiction, and NSF 61 and NSF 372, or to be certified in compliance with NSF 61 and NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Standard: ASSE 1001.
2. Size: NPS 1/4 to NPS 3, as required to match connected piping.
3. Body: Bronze.
4. Inlet and Outlet Connections: Threaded.
5. Finish: Chrome plated.

B. Hose-Connection Vacuum Breakers:
1. Standard: ASSE 1011.
2. Body: Bronze, nonremovable, with manual drain.
3. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
4. Finish: Chrome or nickel plated.

2.4 BACKFLOW PREVENTERS

A. Double-Check, Backflow-Prevention Assemblies:
1. Standard: ASSE 1015.
2. Operation: Continuous-pressure applications unless otherwise indicated.
3. Size: Refer to Drawings.
4. Body: Bronze for NPS 2and smaller; ductile or cast iron with interior lining that complies with AWWA C550 or that is FDA approved or stainless steel for NPS 2-1/2and larger.
5. End Connections: Threaded for NPS 2and smaller; flanged for NPS 2-1/2and larger.
6. Configuration: Designed for horizontal, straight-through flow.
7. Accessories:

a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
b. Valves NPS 2-1/2 and Larger: Non-Rising-Stem-gate type with flanged ends on inlet and outlet.

2.5 BALANCING VALVES

A. Memory-Stop Balancing Valves:
1. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
2. Pressure Rating: 400-psigminimum CWP.
3. Size: NPS 2or smaller.
4. Body: Copper alloy.
5. Port: Standard or full port.
6. Ball: Chrome-plated brass or stainless steel.
7. Seats and Seals: Replaceable.
8. End Connections: Solder joint or threaded.
9. Handle: Vinyl-covered steel with memory-setting device.

2.6 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Water-Temperature Limiting Devices (Refer to Schedule on Drawings):
1. Standard: ASSE 1070/ASSE 1069.
2. Pressure Rating: 125 psig.

3. Type: Thermostatically controlled, water mixing valve.
4. Material: Bronze body with corrosion-resistant interior components.
5. Connections: Threaded union inlets and outlet.
6. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
7. Tempered-Water Setting: Refer to Schedule on Drawings.
8. Tempered-Water Design Flow Rate: Refer to Schedule on Drawings.
9. Valve Finish: Rough bronze.

B. Primary, Thermostatic, Water Mixing Valves (Refer to Schedule on Drawings):
1. Standard: ASSE 1017.
2. Pressure Rating: 125 psig minimum unless otherwise indicated.
3. Type: Exposed-mounted, thermostatically controlled, water mixing valve.
4. Material: Bronze body with corrosion-resistant interior components.
5. Connections: Threaded inlets and outlet.
6. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
7. Tempered-Water Setting: Refer to Schedule on Drawings.
8. Tempered-Water Design Flow Rate: Refer to Schedule on Drawings.
9. Pressure Drop at Design Flow Rate: Refer to Schedule on Drawings.
10. Valve Finish: Rough bronze.
11. Piping Finish: Copper.

C. Individual-Fixture, Water Tempering Valves:
1. Standard: ASSE 1016, thermostatically controlled, water tempering valve.
2. Pressure Rating: 125 psig minimum unless otherwise indicated.
3. Material: Bronze body with corrosion-resistant interior components.
4. Temperature Control: Adjustable.
5. Connections: Threaded inlets and outlet.
6. Finish: Chrome plated.

2.7 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers <**Insert drawing designation if any**>:
1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 2and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:

   a. Strainers NPS 2 and Smaller: No. 20 Mesh.
   b. Strainers NPS 2-1/2 to NPS 4:1/16-inch perforations.

6. Drain: Pipe plug.

2.8 HOSE BIBBS

A. Hose Bibbs HB-1:
1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 3/4 threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze.
9. Finish for Service Areas: Rough bronze.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: Wheel handle.
13. Operation for Finished Rooms: Operating key.
14. Include operating key with each operating-key hose bibb.
15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.9 WALL HYDRANTS

A. Non-freeze Wall Hydrants AFWH:
1. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
2. Pressure Rating: 125 psig.
3. Operation: Loose key.
4. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
5. Inlet: NPS 3/4.
6. Outlet, Concealed: With integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
7. Box: Deep, flush mounted with cover.
8. Box and Cover Finish: Polished nickel bronze or stainless steel.
9. Operating Keys(s): Two with each wall hydrant.

B. Moderate-Climate Wall Hydrants MCWH:
1. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
2. Pressure Rating: 125 psig.
3. Operation: Loose key.
4. Inlet: NPS 3/4.
5. Outlet, Concealed:

   a. With integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
   b. Garden-hose thread complying with ASME B1.20.7.

6. Box: Deep, flush mounted with cover.

7. Box and Cover Finish: Polished nickel bronze or stainless steel.
8. Operating Key(s): Two with each wall hydrant.

2.10 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves <**Insert drawing designation if any**>:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.11 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters SA:
1. Standard: ASSE 1010 or PDI-WH 201.
2. Type: Piston or Diaphragm.
3. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING SPECIALTIES

A. Backflow Preventers: Install in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Balancing Valves: Install in locations where they can easily be adjusted. Set at indicated design flow rates.

C. Temperature-Actuated, Water Mixing Valves: Install with check stops or shutoff valves on inlets and with shutoff valve on outlet.

D. Y-Pattern Strainers: For water, install on supply side of each water pressure-reducing valve and backflow preventer.

E. Water-Hammer Arresters: Install in water piping in accordance with PDI-WH 201.

3.2 PIPING CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.

3.3 IDENTIFICATION

A. Plastic Labels for Equipment: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
   1. Backflow preventers.
   2. Temperature-actuated, water mixing valves.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.4 ADJUSTING

A.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

D. Adjust each double-check, backflow-prevention assembly in accordance with manufacturer's written instructions, authorities having jurisdiction and the device's reference standard.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections.

   1. Test each double-check, backflow-prevention assembly according to authorities having jurisdiction and the device's reference standard.

2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION

SECTION 22 11 23.21

INLINE, DOMESTIC-WATER PUMPS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data Submittals: For each product. Include construction materials, rated capacities, certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1.2 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Detail pumps and adjacent equipment. Show support locations, type of support, weight on each support, required clearances, and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members to which pumps will be attached.
2. Size and location of initial access modules for acoustical tile.

B. Field quality-control reports.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For inline, domestic-water pumps to include in operation and maintenance manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's written instructions for handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: UL 778 for motor-operated water pumps.

C. Drinking Water System Components - Health Effects and Drinking Water System Components - Lead Content Compliance: NSF 61 and NSF 372.

2.2 IN-LINE, SEALLESS ECM CENTRIFUGAL PUMPS

A. Manufacturers: Subject to compliance with requirements, provide products as indicated in schedule on drawings or provide products by one of the following:

1. Taco Comfort Solutions
2. WILO USA LLC - WILO Canada Inc.
3. Bell & Gossett
4. Armstrong

B. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps.

C. Capacities and Characteristics:

1. Refer to schedule on drawings.

D. Pump Construction:

1. Pump and Motor Assembly: ECM type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal.
2. Minimum Working Pressure: 125 psig.
3. Maximum Continuous Operating Temperature: 220 deg F .
4. Casing: Stainless steel, with threaded or companion-flange connections.
5. Impeller: composite or stainless steel.
6. Motor: Auto-adapt Three speed.

2.3 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220500 "Common Work Results for Plumbing."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.4 CONTROLS

A. Thermostats: Electric; adjustable for control of hot-water circulation pump.

1. Type: Water-immersion temperature sensor, for installation in piping.
2. Range: 65 to 200 deg F.
3. Enclosure: NEMA 250, Type 4X.
4. Operation of Pump: On or off.
5. Transformer: Provide if required.
6. Power Requirement: 120 V ac
7. Settings: Start pump at 115 deg F and stop pump at 120 deg F.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for domestic-water-piping system to verify actual locations of piping connections before pump installation.

3.2 INSTALLATION OF PUMPS

A. Comply with HI 1.4.

B. Mount pumps in orientation complying with manufacturer's written instructions.

C. Install continuous-thread hanger rods and vibration isolation of size required to support pump weight.

1. Comply with requirements for hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

D. Install thermostats in hot-water return piping.

E. Install timers on wall.

3.3 PIPING CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to inline, domestic-water pumps, allow space for service and maintenance.

C. Connect domestic-water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.

D. Install shutoff valve on suction side of each pump, and check, shutoff, and throttling valves on discharge side of each pump. Install valves same size as connected piping. Comply with requirements for strainers specified in Section 221119 "Domestic Water Piping Specialties." Comply with requirements for valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."

1. Install pressure gauge and snubber at suction of each pump and pressure gauge and snubber at discharge of each pump. Install at integral pressure-gauge tapings where provided or install pressure-gauge connectors in suction and discharge piping around pumps. Comply with requirements for pressure gauges and snubbers specified in Section 220500 "Common Work Results for Plumbing."

3.4 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring between temperature controllers and devices.

3.5 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment" for identification of pumps.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections with the assistance of a factory-authorized service representative.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Inline, domestic-water pump will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Set thermostats and timers for automatic starting and stopping operation of pumps.
5. Perform the following startup checks for each pump before starting:

   a. Verify bearing lubrication.
   b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
   c. Verify that pump is rotating in the correct direction.

6. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
7. Start motor.
8. Open discharge valve slowly.
9. Adjust temperature settings on thermostats.
10. Adjust timer settings.

3.8 ADJUSTING

A. Adjust inline, domestic-water pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial temperature set points.

C. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION

SECTION 22 13 13

FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 DEFINITIONS

A. PVC: Polyvinyl chloride.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Piping.
2. Manhole structures, frames and covers.
3. Cleanout frames and covers.

B. Shop Drawings: For manholes: include plans, elevations, sections, details, and frames and covers.

C. Field quality control reports.

D. As-Built Drawings.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic pipe and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle structures according to manufacturer's written rigging instructions.

1.4 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Director or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Director’s Representative no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Director’s Representative written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Gravity Sewer Piping:

1. Pipe: ASTM D 3034, SDR 35, solid PVC gravity sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Shielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with the requirements.
2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Ring-Type, Flexible Couplings:

1. Manufacturers: Subject to compliance with the requirements.
2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

E. Nonpressure-Type, Rigid Couplings:

1. Manufacturers: Subject to compliance with the requirements.
2. Description: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling, molded from ASTM C 1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3 CLEANOUTS

A. PVC Cleanouts:

1. Pipe: Schedule 40 PVC size to match sewer pipe.
2. Cleanout Plug: Bronze threaded plug and coated cast iron cleanout ferrule with spigot connection size to fit pipe.
3. Cleanout Box Frame and Lid: Subject to compliance with the requirements of ASTM A 48, provide East Jordon Iron Works Model # 1755 ZPT and 1755 APT Assembly gray iron (CL35B) cleanout frame and cover assembly with countersunk stainless-steel bolts, or approved equal. Cover shall be lockable (apt bolt) frame and cover shall have an asphaltic coating. Provide cast-in-place concrete collar as indicated on the Contract Documents when cleanout is not placed within concrete pavement.

2.4 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: 8-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
5. Riser Sections: 5-inch minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps, FRP ladder, or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.
10. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch minimum-width flange and 26-inch-diameter cover. Covers shall be gasketed, lockable and include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
2. Material: ASTM A 48, Class 35 gray iron unless otherwise indicated.

2.5 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, ACI 350, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Manhole Channels and Benches: Factory or filed formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.48 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

a. Invert Slope: 2.5 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.
   a. Slope: 8 percent.

C. Cleanout Support: Portland cement design mix, 4000 psi minimum, with 0.48 maximum water/cementitious materials ratio.

2.6 PROTECTIVE COATINGS

A. General

1. Include factory- or field-applied protective coatings to structures with Koppers Bitumastic Super Service Black or approved equal.
2. Coating
   a. Manholes: Apply two coats to interior and exterior surfaces.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31, Section "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Contract Drawing details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

D. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope as indicated on Contract Drawings.
2. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.

E. Clear interior of piping of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:

1. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
2. Join dissimilar pipe materials with nonpressure-type, sleeve type couplings.

3.4 MANHOLE INSTALLATION

A. General: Form bottom of excavation clean and smooth to correct elevation allowing for leveling of base.

B. Place stone leveling base and compact to 95 percent of maximum dry density.

C. Set level and plumb.

D. Form continuous concrete channels and benches between inlets and outlet.

E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

F. Apply coatings in accordance with manufacturer's recommendations.

G. Install manhole-cover inserts in frame and immediately below cover.

3.5 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.6 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in sewer pipe or two-way cleanouts where indicated.

B. Set cleanout frames and covers in cast-in-place-concrete block as indicated on the Contract Documents. Set with tops flush with surrounding grade.

3.7 CONNECTIONS

A. Make connections to existing piping and underground manholes.

1. Use commercially manufactured mechanical link seals for watertight connections.
2. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 CLOSING ABANDONED SANITARY SEWER SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes/Septic Tanks/Structures: Pump any liquids within the structure and dispose of properly. Excavate around structure as required and remove structure in its entirety and close open ends of remaining piping.

C. Backfill to grade according to Division 31, Section "Earth Moving."

3.9 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section “Earth Moving”. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

1. Use detectable warning tape over nonferrous piping.

3.10 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:
   a. Alignment: Less than full diameter of inside of pipe is visible between structures.
   b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
   c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
   d. Infiltration: Water leakage into piping.
   e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test to authorize having jurisdiction and the Director’s Representative.
5. Gravity Sewer Piping Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
   a. Fill sewer piping with water. Test with pressure of at least 5 psi and maintain such pressure without leakage for at least 15 minutes.
   b. Close openings in system and fill with water.
   c. Purge air and refill with water.
   d. Disconnect water supply.
   e. Test and inspect joints for leaks.

6. Gravity sewer piping air tests (optional in lieu of hydrostatic tests): Test sanitary sewerage according to the requirements of the authorities having jurisdiction, UNI-B-6, and the following:
7. Option: Test plastic gravity sewer piping according to ASTM F1417.
8. Manholes: Perform negative air pressure (vacuum) test according to ASTM C1244.
9. All sewer piping installed shall be pressure tested and witnessed by the Director's Representative.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

3.11 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.2 WARRANTY

A. Listed manufacturers to provide labeling and warranty of their respective products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation are capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10 ft. head of water.

2.2 PIPING MATERIALS

A. Piping materials to bear label, stamp, or other markings of specified testing agency.

B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings:

1. Marked with CISPI collective trademark.
2. ASTM A74, service cast iron.

B. Gaskets: ASTM C564, rubber.

2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings:

1. Marked with CISPI collective trademark.
2. ASTM A888 or CISPI 301.

B. Heavy-Duty, Hubless-Piping Couplings:
1. Standards: ASTM C1277 and ASTM C1540.
2. Description: Stainless steel shield with stainless steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop.

2.5 COPPER TUBE AND FITTINGS

A. Copper Type DWV Tube: ASTM B306, drainage tube, drawn temper.

B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

C. Hard Copper Tube: ASTM B88, Type L and Type M, water tube, drawn temper.

D. Copper Pressure Fittings:

1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

E. Solder: ASTM B32, lead free with ASTM B813, water-flushable flux.

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in ODs or of different materials. Include end connections of same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:
   a. Standard: ASTM C1173.
   b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
   c. End Connections: Same size as and compatible with pipes to be joined.
   d. Sleeve Materials:

1) For Cast-Iron Soil Pipes: ASTM C564, rubber.
2) For Plastic Pipes: ASTM F477, elastomeric seal or ASTM D5926 PVC.
3) For Dissimilar Pipes: ASTM D5926 PVC or other material compatible with pipe materials being joined.

4. Shielded, Non-pressure Transition Couplings:
   a. Standard: ASTM C1460.
   b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
   c. End Connections: Same size as and compatible with pipes to be joined.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 31 20 00 "Earth Moving."

3.2 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

   1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
   2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch, and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.

    a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.
4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of waste piping in direction of flow is prohibited.

J. Lay buried building waste piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

K. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Waste: Two percent downward in direction of flow for piping NPS 3and smaller; 1 percent downward in direction of flow for piping NPS 4and larger.
2. Horizontal Sanitary Waste Piping: Two percent downward in direction of flow.
3. Vent Piping: One percent down toward vertical fixture vent or toward vent stack.

L. Install cast-iron soil piping in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

M. Install aboveground copper tubing in accordance with CDA's "Copper Tube Handbook."

N. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.

    a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
    b. Comply with requirements for cleanouts specified in Section 22 13 19 "Sanitary Waste Piping Specialties."

2. Install drains in sanitary waste gravity-flow piping.

a. Comply with requirements for drains specified in Section 22 13 19 "Sanitary Waste Piping Specialties."

O. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

P. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 22 05 00 "Common Work Results for Plumbing."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 22 05 00 "Common Work Results for Plumbing."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 22 05 00 "Common Work Results for Plumbing."

3.3 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hubless, Cast-Iron Soil Piping Coupled Joints:

1. Join hubless, cast-iron soil piping in accordance with CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

C. Join copper tube and fittings with soldered joints in accordance with ASTM B828. Use ASTM B813, water-flushable, lead-free flux and ASTM B32, lead-free-alloy solder.

D. Joint Restraints and Sway Bracing:

1. Provide joint restraints and sway bracing for storm drainage piping joints to comply with the following conditions:

a. Provide axial restraint for pipe and fittings 5 inchesand larger, upstream and downstream of all changes in direction, branches, and changes in diameter greater than two pipe sizes.
b. Provide rigid sway bracing for pipe and fittings 4 inches and larger, upstream and downstream of all changes in direction 45 degrees and greater.
c. Provide rigid sway bracing for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction and branch openings.

3.4 INSTALLATION OF SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in ODs.
2. In Waste Drainage Piping: Shielded, nonpressure transition couplings.
3. In Aboveground Force Main Piping: Fitting-type transition couplings.

3.5 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment"

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
3. Vertical Piping: MSS Type 8 or Type 42 clamps.
4. Install individual, straight, horizontal piping runs:

   a. 100 Ft. and Less: MSS Type 1, adjustable, steel clevis hangers.

B. Install hangers for cast-iron and copper soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

C. Support horizontal piping and tubing within 12 inchesof each fitting and coupling.

D. Support vertical runs of cast-iron and copper soil piping to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.

4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Comply with requirements for backwater valves cleanouts and drains specified in Section 22 13 19 "Sanitary Waste Piping Specialties."
6. Equipment: Connect waste piping as indicated.

    a. Provide shutoff valve if indicated and union for each connection.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections in accordance with the following unless otherwise indicated:

1. Install unions, in piping NPS 2and smaller, adjacent to each valve and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

B. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary waste and vent piping in accordance with 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.

    a. 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 waste and vent piping until it has been tested and approved.

    a. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.

    a. Close openings in piping system and fill with water to point of overflow, but not less than 10 ft. head of water.
    b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
    c. 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.

    a. 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.
    b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
    c. Air pressure must remain constant without introducing additional air throughout period of inspection.
    d. 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.

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Repair damage to adjacent materials caused by waste and vent piping installation.

3.10 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller are to be the following:

    1. Service cast-iron soil pipe and fittings; gaskets; and gasketed joints.

2. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.
3. Copper Type DWV tube, copper drainage fittings, and soldered joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

C. Aboveground, soil and waste piping NPS 5 and larger are to be the following:

1. Service cast iron, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

D. Aboveground, vent piping NPS 4 and smaller is to be the following:

1. Service cast iron, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.
3. Copper Type DWV tube, copper drainage fittings, and soldered joints.

   a. Option for Vent Piping, NPS 2-1/2 and NPS 3-1/2: Hard copper tube, Type M; copper pressure fittings; and soldered joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

E. Underground, soil, waste, and vent piping NPS 4 and smaller are to be the following:

1. Service cast-iron soil piping; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

F. Underground, soil and waste piping NPS 5 and larger are to be the following:

1. Service, cast-iron soil piping; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; coupled joints.

END OF SECTION

SECTION 22 13 19.13

SANITARY DRAINS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

PART 2 - PRODUCTS

2.1 DRAIN ASSEMBLIES

A. Sanitary drains are to bear label, stamp, or other markings of specified testing agency.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains (Refer to Schedule on Drawings):
1. Source Limitations: Obtain cast-iron floor drains from single manufacturer.
2. Standard: ASME A112.6.3.
3. Pattern: Floor drain.
4. Body Material: Gray iron.
5. Seepage Flange: Required.
6. Clamping Device: Required.
7. Outlet: Bottom.
8. Top or Strainer Material: Gray iron or Nickel bronze.
9. Top of Body and Strainer Finish: Nickel bronze Cast iron.
10. Top Shape: Round.
11. Top Loading Classification: Heavy Duty.
12. Trap Material: Cast iron.
13. Trap Pattern: Deep-seal P-trap.

2.3 STAINLESS STEEL CHANNEL DRAINAGE SYSTEMS

A. Stainless Steel Channel Drainage System, ASME A112.3.1 (Refer to Schedule on Drawings):
1. Source Limitations: Obtain stainless steel channel drainage systems from single manufacturer.
2. Description: Modular system of stainless steel channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling.

3. Standard: ASME A112.3.1 for trench drains.
4. Channel Sections: Interlocking joint, stainless steel with level invert.
5. Grates: Manufacturer's designation "Medium Duty," with slots or perforations, and of width and thickness that fit recesses in channels.

    a. Material: Stainless steel.
    b. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.

6. Supports, Anchors, and Setting Devices: Manufacturer's standard, unless otherwise indicated.
7. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION OF SANITARY DRAINS

A. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.
3. Set with grates depressed according to the following drainage area radii:

    a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inchtotal depression.
    b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
    c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

4. Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring.

    a. Maintain integrity of waterproof membranes where penetrated.

5. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

B. Comply with ASME A112.3.1 for installation of stainless-steel channel drainage systems.

1. Install on support devices, so that top will be flush with adjacent surface.

3.2 CONNECTIONS

A. Comply with requirements in Section 22 13 16 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 22 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show fabrication and installation details for frost-resistant vent terminals.

1.2 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sanitary waste piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTIONS

A. Sanitary waste piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary waste piping specialty components.

2.2 CLEANOUTS

A. Cast-Iron Exposed Cleanouts CO:
1. Standard: ASME A112.36.2M.
2. Size: Same as connected drainage piping
3. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch Hubless, cast-iron soil pipe test tee as required to match connected piping.
4. Closure: Countersunkbrass plug.
5. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Cast-Iron Exposed Floor Cleanouts FPCO:
1. Standard: ASME A112.36.2M for heavy-duty, adjustable housing cleanout.
2. Size: Same as connected branch.
3. Type: Threaded, adjustable housing.
4. Body or Ferrule: Cast iron.
5. Outlet Connection:Neoloc.
6. Closure: Plastic plug.
7. Adjustable Housing Material: Cast iron with threads.
8. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
9. Frame and Cover Shape: Round.
10. Top-Loading Classification: Extra HeavyDuty.
11. Riser: ASTM A74, Service Class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts WPCO:
1. Standard: ASME A112.36.2M. Include wall access.
2. Size: Same as connected drainage piping.
3. Body: Hub-and-spigot, cast-iron soil pipe T-branch Hubless, cast-iron soil pipe test tee as required to match connected piping.
4. Closure Plug:
   a. Brass.
   b. Countersunk head.
   c. Drilled and threaded for cover attachment screw.
   d. Size: Same as or not more than one size smaller than cleanout size.
5. Wall Access, Cover Plate: Round, flat, chrome-plated brass or stainless steel cover plate with screw.

2.3 AIR-ADMITTANCE VALVES

A. Fixture Air-Admittance Valves:
1. Standard: ASSE 1051, Type A for single fixture or Type B for branch piping.
2. Housing: Plastic.
3. Operation: Mechanical sealing diaphragm.
4. Size: Same as connected fixture or branch vent piping.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Deep-Seal Traps:
1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.
   a. NPS 2: 4-inch- minimum water seal.
   b. NPS 2-1/2 and Larger: 5-inch- minimum water seal.

B. Floor-Drain, Inline Trap Seal:
   1. Description: Inline floor drain trap seal, forming a physical barrier to slow trap evaporation while not impeding flow from drain.
   2. Material: Polymer.
   3. Standard: Tested and certified in accordance with ASSE 1072.
   4. Listing: ICC-ES listed.
   5. Size: Same as floor drain outlet or strainer throat.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

   1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
   2. Locate at each change in direction of piping greater than 45 degrees.
   3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
   4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Install fixture air-admittance valves on fixture drain piping.

E. 7Install deep-seal traps on floor drains and other waste outlets, if indicated.

F. Install wood-blocking reinforcement for wall-mounting-type specialties.

G. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 PIPING CONNECTIONS

A. Comply with requirements in Section 22 13 16 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment, to allow service and maintenance.

3.3 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

1. Nameplates and signs are specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 22 33 00

ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.2 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of commercial, electric, domestic-water heater.

B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

C. Sample Warranty: For special warranty.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include emergency, operation, and maintenance manuals.

1.4 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including storage tank and supports.
   b. Faulty operation of controls.
   c. Deterioration of metals, metal finishes, and other materials beyond normal use.
2. Warranty Periods: From date of Substantial Completion.
   a. Commercial, Light-Duty, Storage, Electric, Domestic-Water Heaters:
      1) Storage Tank: Three years.
      2) Controls and Other Components: One year.
   b. Expansion Tanks: Five years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.

B. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1.

2.2 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Storage, Electric, Domestic-Water Heaters: (EWH-A)

1. Manufacturers: Subject to compliance with requirements, provide products indicated in schedule on drawings or by one of the following:
   a. A. O. Smith Corporation.
   b. Lochinvar, LLC.
   c. Rheem Manufacturing Company.
   d. Ruud Water Heaters; a Rheem brand.
   e. State Industries.
2. Source Limitations: Obtain domestic-water heaters from single source from single manufacturer.
3. Standard: UL 174.
4. Storage-Tank Construction: Steel, vertical arrangement.
   a. Tappings: ASME B1.20.1 pipe thread.
   b. Pressure Rating: 150 psig.
   c. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending lining material into tappings.
5. Factory-Installed, Storage-Tank Appurtenances:
   a. Anode Rod: Replaceable magnesium.
   b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
   c. Drain Valve: Corrosion-resistant metal with hose-end connection.
   d. Insulation: Comply with ASHRAE/IES 90.1.
   e. Jacket: Steel with enameled finish or high-impact composite material.
   f. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
   g. Heating Elements: Electric, screw-in immersion type.
   h. Temperature Control: Adjustable thermostat.
   i. Safety Control: High-temperature-limit cutoff device or system.
   j. Relief Valve: ASME rated and stamped for combination temperature-and-pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of domestic-water heater. Select relief valve with sensing element that extends into storage tank.

B. Capacity and Characteristics: (Refer to schedule on drawings)

2.3 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Expansion Tanks: (ET-1)

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. A. O. Smith Corporation.
   b. AMTROL, Inc.
   c. State Industries.
   d. Taco Comfort Solutions.
2. Source Limitations: Obtain domestic-water expansion tanks from single source from single manufacturer.
3. Description: Steel pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air pre-charge to minimum system-operating pressure at tank.
4. Construction:
   a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
   b. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
   c. Air-Charging Valve: Factory installed.
5. Capacity and Characteristics: (Refer to schedule on drawings)
   a. Working-Pressure Rating: 150 psig.
   b. Air Pre-charge Pressure: Field adjust pressure to system pressure.

B. Piping-Type Heat Traps: Field-fabricated piping arrangement in accordance with ASHRAE/IES 90.1 ASHRAE 90.2.

C. Heat-Trap Fittings: ASHRAE/IES 90.1.

D. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of domestic-water heater. Select relief valves with sensing element that extends into storage tank.

E. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.

F. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base. Comply with requirements for concrete bases specified in Section 03 30 00 "Cast-in-Place Concrete."

1. Maintain manufacturer's recommended clearances.

2. Arrange units so controls and devices that require servicing are accessible.
3. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
4. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
5. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
6. Install anchor bolts to elevations required for proper attachment to supported equipment.
7. Anchor domestic-water heaters to substrate.

B. Install electric, domestic-water heaters level and plumb, in accordance with layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 22 05 23.12 "Ball Valves for Plumbing Piping,".

C. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend domestic-water heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

D. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 22 11 19 "Domestic Water Piping Specialties."

E. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 22 05 19 "Meters and Gages for Plumbing Piping."

F. Install thermometers on inlet and outlet piping of residential, solar, electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 22 05 19 "Meters and Gages for Plumbing Piping."

G. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

H. Fill electric, domestic-water heaters with water.

I. Charge domestic-water expansion tanks with air to required system pressure.

J. Install dielectric fittings in all locations where piping of dissimilar metals is to be joined. The wetted surface of the dielectric fitting contacted by potable water shall contain less than 0.25 percent of lead by weight.

3.2 PIPING CONNECTIONS

A. Comply with requirements for piping specified in Section 22 11 16 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial, electric, domestic-water heaters. Training shall be a minimum of one hour(s).

END OF SECTION

SECTION 22 42 00

COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.1 DEFINITIONS

A. FRP: Fiberglass-reinforced plastic.

B. High-Efficiency Flush Volume: 1.28 gal. or less per flush.

C. PMMA: Polymethyl methacrylate; also known as "acrylic."

D. WaterSense Fixture: Water closet and/or flushometer valve/tank certified by the EPA to meet the WaterSense performance criteria.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Include construction details, material descriptions and thicknesses, dimensions of individual components and profiles, and finishes for plumbing fixtures.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. For lavatories and faucets.

   a. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

      1) Servicing and adjustments of automatic faucets.

2. For shower valves to include in maintenance manuals.
3. For sinks and faucets to include in operation and maintenance manuals.

   a. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

      1) Servicing and adjustments of automatic faucets.

4. For flushometer valves to include in operation and maintenance manuals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

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

1. Faucet Washers and O-Rings: Equal to 10percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.
3. Shower Valve Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
4. Shower Valve Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.
5. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Lavatory faucets, sink faucets, shower valves, and wash fountain spray heads and faucets intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), with requirements of the Authority Having Jurisdiction (AHJ), and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 COMMERCIAL LAVATORIES

A. Lavatories, Wall Mounted:

1. Lavatories, Wall Mounted - Precast GFRC, Rectangular Countertop Deck with Integral Rectangular Basin(s) LAV-1 & LAV-2:
   a. Basin(s) and Countertop:

      1) Standards: CSA B45.8/IAPMO Z403 and ICC A117.1.
      2) Type: Straight front and side aprons with straight back.
      3) Number of Stations: One.
      4) Faucet-Hole Punching (per Station): One hole.
      5) Faucet-Hole Location: Top.
      6) Drain Type: 1-1/4-inch grid drain assembly.

7) Color: Polar Ice.
8) Mounting: Floor Mounted Carrier.

b. Faucet: LF-1.
c. Waste Fittings:

1) Standard: ASME A112.18.2/CSA B125.2.
2) Type: 1-1/4-inch grid drain assembly.
3) Finish: Polished chrome.

d. Support: Manufacturer's standard product.
e. Lavatory Mounting Height: Standard and Accessible in accordance with ICC A117.1.

B. Lavatory Faucets, Manually Operated LF-1:
1. Standard: ASME A112.18.1/CSA B125.1.
2. Operation Type: Single control, mixing Commercial.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
4. Body Type: Single hole.
5. Body Material: Commercial, solid-brass, or die-cast housing with brazed copper and brass waterway.
6. Finish: Polished chrome plate.
7. Maximum Flow Rate: 0.5 gpm.
8. Mounting Type: Deck, exposed.
9. Valve Handle(s): Push button.
10. Spout: Rigid type.
11. Spout Outlet: Spray.

C. Lavatory Supply Fittings:

1. NSF Standards: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.
2. Standard: ASME A112.18.1/CSA B125.1.
3. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless steel wall flange.
4. Supply Stops: Chrome-plated-brass, one-quarter-turn with inlet connection matching supply piping.
5. Operation: Loose key.

a. Risers Size: NPS 3/8.
b. Risers Material: ASME A112.18.6/CSA B125.6, braided flexible hose.

D. Lavatory Waste Fittings:

1. Standard: ASME A112.18.2/CSA B125.2.
2. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.
3. Trap:

a. Size: NPS 1-1/2 by NPS 1-1/4.
b. Material:

1) Chrome-plated, two-piece, cast-brass trap and swivel elbow with 17 gauge-thick brass tube to wall

2.3 COMMERCIAL SHOWERS

1. Showers - Wall Mounted SH-1:
   a. Source Limitations: Obtain showers from single source from single manufacturer.
   b. Description: Stainless steel, wall-mounted, surface-enclosure shower fixture with individual nozzles and stainless steel shroud to ceiling.
   c. Standards:

      1) ASME A112.18.1/CSA B125.1.
      2) ASSE 1016/ASME A112.1016/CSA B125.16.

   d. Metal Nominal Thickness: 18 gauge minimum.
   e. Number of Shower Nozzles: One.
   f. Height to Nozzles: 72 inches.
   g. Control:

      1) Air push-button operation.

   h. Flow-Control Fitting: 1.5 gpm for each shower head.
   i. EPA WaterSense: Required.
   j. Mounting: Wall bracket.
   k. Supplies: NPS 3/4 copper tubing with valves.

2.4 COMMERCIAL SINKS

A. Service Sinks, Floor Mounted:

1. Service Sinks, Floor Mounted - Molded Stone MS-1:
   a. Source Limitations: Obtain sinks from single source from single manufacturer.
   b. Fixture:

      1) Standard: ASME A112.18.2/CSA B125.2.
      2) Shape: Square.
      3) Nominal Size: 24 by 24 inches.
      4) Height: 10 inches.
      5) Rim Guard: On front top surfaces.
      6) Color: White.
      7) Drain: Grid with NPS 3 outlet.

   c. Mounting: On floor and flush to wall.
   d. Faucet: SF-2.

B. Kitchen/Utility Sinks:

1. Kitchen/Utility Sinks, Wall Mounted - Stainless Steel SNK-1:
   a. Source Limitations: Obtain sinks from single source from single manufacturer.
   b. Fixture:
      1) Standards:
         a) ASME A112.19.3/CSA B45.4.
         b) NSF 2.
      2) Type: Stainless steel, wall mounted, sound-deadened unit with backsplash.
      3) Number of Compartments: One.
      4) Overall Dimensions: 49.5” x 24” x 10”.
      5) Material: 14gauge, Type 304 stainless steel.
      6) Compartment:
         a) Dimensions: 18” x 20.5” with 30” drain board.
         b) Drain: Grid with NPS 1-1/2.
         c) Drain Location: Centered in compartment.
      7) Integral Drainboard(s): Right side(s).
         a) Dimensions Each: 30”.
   c. Faucet(s): SF-1.
      1) Number Required: One.
      2) Mounting: On backsplash.
   d. Supply Fittings:
      1) Standard: ASME A112.18.1/CSA B125.1.
      2) Supplies: Chrome-plated brass compression stop with inlet connection matching water-supply piping type and size.
         a) Operation: Loose key.
         b) Risers: NPS 1/2, chrome-plated, soft-copper flexible tube.
   e. Waste Fittings:
      1) Standard: ASME A112.18.2/CSA B125.2.
      2) Trap(s) Size: NPS 1-1/2.
      3) Trap(s) Material:
         a) Chrome-plated, two-piece, cast-brass trap and swivel elbow with 17-gauge brass tube to wall.

C. Sink Faucets, Manually Operated:

1. Sink Faucets, Manually OperatedSF-1: Two handle, mixing.
   a. Source Limitations: Obtain sink faucets from single source from single manufacturer.
   b. Standards:
      1) ASME A112.18.1/CSA B125.1.
      2) NSF 61.
      3) NSF 372.
   c. Description: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
   d. Body Type: Widespread.
   e. Body Material: Commercial, solid-brass, or die-cast housing with brazed copper and brass waterway.
   f. Finish: Chrome plated.
   g. Maximum Flow Rate: 1.5 gpm.
   h. Mounting Type: Backsplash.
   i. Valve Handle(s): Lever.
   j. Spout Type: Swing.
   k. Vacuum Breaker: Not required for hose outlet.
   l. Spout Outlet: Laminar flow.

2. Sink Faucets, Manually Operated - Service Sink SF-2:
   a. Source Limitations: Obtain sink faucets from single source from single manufacturer.
   b. Description: Wall/back mounted, brass body, with integral service stops, checks, spout with bucket/pail hook, 3/4-inch hose thread end, integral vacuum breaker, inlets 8 inches o.c., and two-handle mixing.
   c. Faucet:
      1) Standards:
         a) ASME A112.18.1/CSA B125.1.
         b) NSF 61 and NSF 372.
         c) ICC A117.1.
         d) ASSE 1001 (VB).
      2) Finish: Rough chrome plated.
      3) Handles: Lever.
      4) Cartridges: Ceramic.
      5) Brace: Adjustable top brace.
   d. Vacuum Breaker: Required for hose outlet.
   e. Spout Outlet: Hose thread in accordance with ASME B1.20.7.

D. Sink Supply Fittings:

1. NSF Standards: Comply with NSF 61 and NSF 372 for supply-fitting materials that will be in contact with potable water.
2. Standard: ASME A112.18.1/CSA B125.1.
3. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless steel wall flange.
4. Supply Stops: Chrome-plated brass, one-quarter-turn valve with inlet connection matching supply piping.
5. Operation: Loose key.

    a. Risers Sizes: NPS 3/8.
    b. Risers Material: Chrome-plated, soft-copper flexible tube.

E. Sink Waste Fittings:

1. Standard: ASME A112.18.2/CSA B125.2.
2. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.
3. Trap:

    a. Size: NPS 1-1/2.
    b. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 17-gauge brass tube to wall; and chrome-plated brass or steel wall flange.

F. Grout:

1. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
2. Characteristics: Nonshrink; recommended for interior and exterior applications.
3. Design Mix: 5000 psi, 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

2.5 COMMERCIAL URINALS

A. Urinals, Wall Hung:

1. Urinals, Wall Hung - Back Outlet, Washout UR-1:
    a. Fixture:

        1) Standards:

            a) ASME A112.19.2/CSA B45.1.
            b) ASME A112.19.5/CSA B45.15.

        2) Material: Vitreous china.
        3) Type: Washout with extended shields.
        4) Strainer or Trapway: Manufacturer's standard strainer with integral trap.
        5) Water Consumption: 0.125 gpf.
        6) Spud Size and Location: NPS 3/4, top.
        7) Outlet Size and Location: NPS 2, back.

8) Color: White.

b. Flushometer Valve: FV.
c. Waste Fitting:

1) Standard: ASME A112.18.2/CSA B125.2 for coupling.
2) Size: NPS 2.

d. Support: Urinal carrier, floor affixed with steel uprights with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture.
e. Urinal Mounting Height: Accessible in accordance with ICC A117.1.

2.6 COMMERCIAL WATER CLOSETS

A. Water Closets, Wall Mounted:

1. Water Closets, Wall Mounted - Top Spud WC-1 & WC-2:
a. Source Limitations: Obtain water closets from single source from single manufacturer.
b. Standard: ASME A112.19.2/CSA B45.1.
c. Bowl:

1) Material: Vitreous china.
2) Type: Siphon jet.
3) Style: Flushometer valve.
4) Mounting Height: Standard and Accessible in accordance with ICC A117.1.
5) Rim Contour: Elongated.
6) Water Consumption: 1.28 gal. per flush.
7) Spud Size and Location: NPS 1-1/2; top.
8) Color: White.

d. Flushometer Valve: FV.
e. Toilet Seat: TS.
f. Support: Water-closet carrier, floor affixed.

2.7 FLUSHOMETER VALVES

A. Flushometer Valves, Manually Operated:

1. Flushometer Valves, Manually Operated - Diaphragm, Lever Handle FV:
a. Source Limitations: Obtain flushometer valve from single source from single manufacturer.
b. Standard: ASSE 1037/ASME 112.1037/CSA B125.37.
c. Minimum Pressure Rating: 125 psig.
d. Features: Include integral check stop and backflow-prevention device.
e. Material: Brass body with corrosion-resistant components.
f. Style: Exposed.

g. Flushometer-Valve Finish: Chrome-plated.
h. Handle Finish: Chrome plated.
i. Consumption: 1.28 gal. per flush.
j. Minimum Inlet: NPS 1.

2.8 TOILET SEATS

A. Toilet Seats - Commercial TS:
1. Source Limitations: Obtain toilet seat from single source from single manufacturer.
2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (heavy duty).
5. Shape: Elongated rim, open front.
6. Hinge: Self-sustaining, check.
7. Hinge Material: Noncorroding metal.
8. Seat Cover: Not required.
9. Color: White.

2.9 FIXTURE CARRIERS

A. Fixture Carriers - Lavatory
1. Source Limitations: Obtain lavatory carriers from single source from single manufacturer.
2. Standards:

a. ASME A112.6.1M.
b. ASME A112.6.2.

B. Fixture Carriers - Urinal:
1. Source Limitations: Obtain urinal carriers from single source from single manufacturer.
2. Standard: ASME A112.6.1M.
3. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings, gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space**.**

C. Fixture Carriers - Water Closet:
1. Source Limitations: Obtain water closet carriers from single source from single manufacturer.
2. Standard: ASME A112.6.1M.
3. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings, gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space**.**

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water-supply piping and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine walls and floors for suitable conditions where plumbing fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF COMMERCIAL PLUMBING FIXTURES

A. Lavatory Installation:

1. Install lavatories level and plumb in accordance with roughing-in drawings.
2. Install supports, affixed to building substrate, for wall-mounted lavatories.
3. Install accessible, wall-mounted lavatories at mounting height in accordance with ICC A117.1.
4. Install water-supply piping with stop on each supply to each lavatory faucet. Install stops in locations that are accessible for ease of operation.
5. Install trap and waste piping on each drain outlet of each lavatory to be connected to sanitary drainage system.
6. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 00 "Common Work Results for Plumbing."
7. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."
8. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 22 07 19 "Plumbing Piping Insulation."

B. Shower Installation:

1. Assemble shower components in accordance with manufacturers' written instructions.
2. Install showers level and plumb in accordance with roughing-in drawings.
3. Install ball valves in water-supply piping to the shower if supply stops are specified with the shower valve. Comply with ball[**or gate**] valve requirements specified in Section 22 05 23 "General Duty Valves for Plumbing Piping." Install valves in locations that are accessible for ease of operation.
4. Install shower flow-control fittings with specified maximum flow rates in shower arms.
5. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 00 "Common Work Results for Plumbing."

C. Sink Installation:

1. Install sinks level and plumb in accordance with roughing-in drawings.
2. Install supports, affixed to building substrate, for wall-mounted sinks.
3. Install accessible, wall-mounted sinks at mounting height in accordance with ICC A117.1.
4. Set floor-mounted sinks in leveling bed of cement grout.
5. Install water-supply piping with stop on each supply to each sink faucet.

    a. Exception: Use ball valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 22 05 23 "General Duty Valves for Plumbing Piping."
    b. Install stops/valves in locations that are accessible for ease of operation.

6. Install trap and waste piping on each drain outlet of each sink to be connected to sanitary drainage system.
7. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 00 "Common Work Results for Plumbing."
8. Seal joints between sinks, counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."
9. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 22 07 19 "Plumbing Piping Insulation."

D. Urinal Installation:

1. Install urinals level and plumb in accordance with roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste-fitting seals and attached to supports.
3. Install accessible, wall-mounted urinals at mounting height in accordance with ICC A117.1.
4. Install supports, affixed to building substrate, for wall-hung urinals.
5. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
6. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.
7. Measure support height installation from finished floor, not structural floor.
8. Install flushometer-valve, water-supply fitting on each supply to each urinal.
9. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
10. Install lever-handle flushometer valves for accessible urinals with handle mounted on open side of compartment.
11. Install actuators in locations easily reachable for people with disabilities.
12. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Install deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 00 "Common Work Results for Plumbing."
13. Seal joints between urinals, walls, and floors using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to urinal color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

E. Water Closet Installation:

1. Install water closets level and plumb in accordance with roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height in accordance with ICC A117.1.
4. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
5. Use carrier supports with waste-fitting assembly and seal.
6. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals, and affix to building substrate.
7. Measure support height installation from finished floor, not structural floor.
8. Install flushometer-valve, water-supply fitting on each supply to each water closet.
9. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
10. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
11. Install actuators in locations easily reachable for people with disabilities.
12. Install toilet seats on water closets.
13. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Install deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 00 "Common Work Results for Plumbing."
14. Seal joints between water closets, walls, and floors using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to water-closet color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

3.3 INSTALLATION OF PIPING CONNECTIONS

A. Connect plumbing fixtures with water supplies and soil, waste, and vent piping. Use size fittings required to match plumbing fixtures.

B. Comply with water piping requirements specified in Section 22 11 16 "Domestic Water Piping."

C. Comply with soil, waste, and vent piping requirements specified in Section 22 13 16 "Sanitary Waste and Vent Piping."

D. Install protective-shielding pipe covers and enclosures on exposed supplies and waste piping of accessible plumbing fixtures. Comply with requirements in Section 22 07 19 "Plumbing Piping Insulation."

E. Where installing piping adjacent to water closets and urinals, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust plumbing fixtures and controls. Replace damaged and malfunctioning plumbing fixtures, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

C. Adjust water pressure at shower valves to produce proper flow.

D. Adjust water pressure at flushometer valves to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of plumbing fixtures, inspect and repair damage to finishes. Replace any fixtures unable to be repaired to the satisfaction of the Owner.

B. Clean plumbing fixtures and associated faucets, valves, flushometer valves, and fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed plumbing fixtures and associated faucets, valves, flushometer valves, and fittings.

D. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 22 47 00

DRINKING FOUNTAINS AND WATER COOLERS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
b. Include operating characteristics, and furnished specialties and accessories.

1.2 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For bottle filling stations, to include in maintenance manuals.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions for delivery, storage, and handling.

1.4 WARRANTY

A. Manufacturer Warranty: Manufacturer agrees to repair or replace bottle filling stations that fail in materials or workmanship within specified warranty period.

B. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Standards:

1. Bottle filling stations, intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), requirements of the authority having jurisdiction, and with NSF 61 or NSF 372, or be certified in compliance with

NSF 61 or NSF 372 by an ANSI-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 BOTTLE FILLING STATIONS

A. Bottle Filling Station - Surface Wall Mounted, Stainless Steel, freeze resistant BF-1: (Refer to schedule on drawings)
   1. Source Limitations: Obtain surface wall-mounted, stainless steel, bottle filling stations from single source from single manufacturer.
   2. Standards:
      a. NSF 61.
      b. NSF 372.
      c. ASME A112.19.3/CSA B45.4.
   3. Type: Vandal resistantfreeze resistant.
   4. Cabinet: Stainless steel.
   5. Bottle Filler: Push-button activation. Fill rate is 0.5 to 1.5 gpm.
   6. Drain: Grid type with NPS 1-1/4 tailpiece.
   7. Supply: NPS 3/8 with shutoff valve.
   8. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 brass P-trap.
   9. Filter: One or more water filters with capacity sized for unit peak flow rate.
      a. Standards:
         1) NSF 42.
         2) NSF 53.
   10. Support: Provide manufacturer's mounting plate.
   11. Bottle Filling Station Mounting Height: Accessible in accordance with ICC A117.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixtures level and plumb in accordance with roughing-in drawings. For fixtures indicated for juveniles, install at height required by authorities having jurisdiction.

B. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

C. Install mounting frames, affixed to building construction, and attach bottle filling stations to mounting frames.

D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball[valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."

E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 00 "Common Work Results for Plumbing."

G. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

3.3 PIPING CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 22 11 16 "Domestic Water Piping."

C. Install ball[**or gate**] shutoff valve on water supply to each fixture. Comply with valve requirements specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."

D. Comply with soil and waste piping requirements specified in Section 22 13 16 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, in accordance with manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 23 05 00
COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data:

1. For each type of product, excluding motors which are included in Part 1 of HVAC equipment Sections.

   a. Include construction details, material descriptions, and dimensions of individual components, and finishes.
   b. Include operating characteristics and furnished accessories.

1.2 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter.

B. Field quality-control reports.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of expansion joint, meter, and gauge to include in operation and maintenance manuals.

1.4 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 SLEEVES AND SLEEVE SEALS

A. Sleeves without Waterstop:

1. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, hot-dip galvanized, with plain ends.
2. Steel Sheet Sleeves: ASTM A653/A653M, 24 gauge minimum thickness; hot-dip galvanized, round tube closed with welded longitudinal joint.
3. PVC Pipe Sleeves: ASTM D1785, Schedule 40.
4. Molded-PVC Sleeves: With nailing flange.

2.2 METERS AND GAUGES FOR HVAC PIPING

A. Duct-Thermometer Mounting Brackets:

1. Description: Flanged bracket with screw holes, for attachment to air duct and made to hold thermometer stem.

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES - GENERAL

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout or silicone sealant, seal space outside of sleeves in floors/slabs/walls without sleeve-seal system. Select to maintain fire resistance of floor/slab/wall.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants that joint sealant manufacturer's literature indicates is appropriate for size, depth, and location of joint.

3.2 INSTALLATION OF SLEEVES WITH WATERSTOP

A. Install sleeve with waterstop as new walls and slabs are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange centered across width of concrete slab or wall.

C. Secure nailing flanges to wooden concrete forms.

D. Using grout or silicone sealant, seal space around outside of sleeves.

3.3 INSTALLATION OF METERS AND GAUGES

A. Install duct-thermometer-mounting brackets in walls of ducts. Attach to duct with screws.

B. Install permanent indicators on walls or brackets in accessible and readable positions.

C. Install connection fittings in accessible locations for attachment to portable indicators.

D. Install thermometers in the following locations:

1. Outside-, return-, supply-, and mixed-air ducts.

3.4 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gauges to proper angle for best visibility.

3.5 FIELD QUALITY CONTROL

A. Sleeves and Sleeve Seals:

1. Perform the following tests and inspections:

a. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
b. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

2. Prepare test and inspection reports.

B. Escutcheons:

1. Using new materials, replace broken and damaged escutcheons and floor plates.

3.6 SLEEVES APPLICATION

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above and below Grade:

a. Sleeves with waterstops.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

2. Interior Walls and Partitions:

a. Sleeves without waterstops.

3.7 THERMOMETER APPLICATION

A. Thermometers at outside-, return-, supply-, and mixed-air ducts are to be the following:

1. Liquid-filled, bimetallic-actuated type.

B. Thermometer stems are to be of length to match thermowell insertion length.

3.8 THERMOMETER SCALE-RANGE APPLICATION

A. Scale Range for Air Ducts:

1. Minus 40 to plus 110 deg F.

END OF SECTION

SECTION 23 05 29
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.2 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.3 MATERIALS

A. Aluminum: ASTM B221.

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; galvanized.

D. Stainless Steel: ASTM A240/A240M.

E. Threaded Rods: Continuously threaded. Zinc-plated or galvanized steel for indoor applications and stainless steel for outdoor applications. Mating nuts and washers of similar materials as rods.

F. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits.

Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A36/A36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled strut systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

J. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

3. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and attachments for general service applications.

F. Use stainless steel pipe hangers and stainless steel or corrosion-resistant attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
4. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
5. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
6. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
7. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
10. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.

11. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
12. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building

attachments where required in concrete construction.

END OF SECTION

SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Equipment-Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

2.2 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Seton Identification Products; a Brady Corporation company.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color coded, with lettering indicating service and showing flow direction in accordance with ASME A13.1.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

E. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

F. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings. Also include:

1. Pipe size.
2. Flow-Direction Arrows: Include flow-direction arrows on main distribution piping. Arrows may be either integral with label or applied separately.
3. Lettering Size: Size letters in accordance with ASME A13.1 for piping.

2.3 DUCT LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Seton Identification Products; a Brady Corporation company.

B. Letter and Background Color: As indicated for specific application under Part 3.

C. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

D. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

E. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

F. Fasteners: Stainless steel rivets or self-tapping screws.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings. Also include the following:

1. Duct size.
2. Flow-Direction Arrows: Include flow-direction arrows on main distribution ducts. Arrows may be either integral with label or may be applied separately.
3. Lettering Size: At least 1/2 inch for viewing distances of up to 72 inches and proportionately larger lettering for greater viewing distances.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 INSTALLATION, GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.3 INSTALLATION OF PIPE LABELS

A. Install pipe labels showing service and flow direction with permanent adhesive on pipes.

B. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Within 3 ft. of each valve and control device.
2. At access doors, manholes, and similar access points that permit view of concealed piping.
3. Within 3 ft. of equipment items and other points of origination and termination.
4. Spaced at maximum intervals of 25 ft. along each run. Reduce intervals to 10 ft. in areas of congested piping, ductwork, and equipment.

C. Do not apply plastic pipe labels or plastic tapes directly to bare pipes conveying fluids at temperatures of 125 deg F or higher. Where these pipes are to remain uninsulated, use a short section of insulation or use stenciled labels.

D. Flow-Direction Arrows: Use arrows to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

E. Pipe-Label Color Schedule:

1. Refrigerant Piping: White letters on an ANSI Z535.1 safety-blue background.

3.4 INSTALLATION OF DUCT LABELS

A. Install self-adhesive duct labels showing service and flow direction with permanent adhesive on air ducts.

1. Provide labels in the following color codes:

a. For air supply ducts: White letters on blue background .
b. For air return ducts: White letters on blue background .
c. For exhaust-, outside-, relief-, return-, and mixed-air ducts: White letters on blue background .

B. Stenciled Duct-Label Option: Stenciled labels showing service and flow direction may be provided instead of plastic-laminated duct labels, at Installer's option.

1. For all air ducts: Black letters on white background .

C. Locate label near each point where ducts enter into and exit from concealed spaces and at maximum intervals of 20 ft. where exposed or are concealed by removable ceiling system.

D. Stenciled Access Panels and Door Labels, Equipment Labels, and Similar Operational Instructions:

1. Black letters on White background .

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

F. TDH: Total dynamic head.

G. UFAD: Underfloor air distribution.

1.2 ACTION SUBMITTALS

A. Sustainable Design Submittals:

1. Air-Balance Report: Documentation indicating that Work complies with ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
2. TAB Report: Documentation indicating that Work complies with ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 60 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Certified TAB reports.

C. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.4 QUALITY ASSURANCE

A. TAB Specialists Qualifications, Certified by AABC:

1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC.
2. TAB Technician: Employee of the TAB specialist and certified by AABC.

B. TAB Specialists Qualifications, Certified by NEBB or TABB:

1. TAB Field Supervisor: Employee of the TAB specialist and certified by NEBB or TABB.
2. TAB Technician: Employee of the TAB specialist and certified by NEBB or TABB.

C. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

1. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

E. Code and AHJ Compliance: TAB is required to comply with governing codes and requirements of authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data, including fan curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

I. Examine operating safety interlocks and controls on HVAC equipment.

J. Examine control dampers for proper installation for their intended function of isolating, throttling, diverting, or mixing air flows.

K. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume dampers are open and functional.
d. Clean filters are installed.
e. Fans are operating, free of vibration, and rotating in correct direction.
f. Variable-frequency controllers' startup is complete and safeties are verified.
g. Automatic temperature-control systems are operational.
h. Ceilings are installed.
i. Windows and doors are installed.
j. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system in accordance with the procedures contained in the contractors certifying agency's standards and in this Section.

B. Cut insulation, ducts, pipes, and equipment casings for installation of test probes to the

minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 23 33 00 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish in accordance with Section 23 07 13 "Duct Insulation," Section 23 07 16 "HVAC Equipment Insulation," and Section 23 07 19 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 TESTING, ADJUSTING, AND BALANCING OF HVAC EQUIPMENT

A. Test, adjust, and balance HVAC equipment indicated on Drawings, including, but not limited to, the following:

1. Fans and ventilators.
2. Unit heaters.
3. Energy-recovery units.
4. Air-handling units.
5. Heating and ventilating units.
6. Heat pumps.
7. Fan coil units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' Record drawings duct layouts.

C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Verify that motor starters are equipped with properly sized thermal protection.

G. Check dampers for proper position to achieve desired airflow path.

H. Check for airflow blockages.

I. Check condensate drains for proper connections and functioning.

J. Check for proper sealing of air-handling-unit components.

3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

   a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
   b. Where duct conditions allow, measure airflow by main Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses close to the fan and prior to any outlets, to obtain total airflow.
   c. Where duct conditions are unsuitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.

2. Measure fan static pressures as follows:

   a. Measure static pressure directly at the fan outlet or through the flexible connection.
   b. Measure static pressure directly at the fan inlet or through the flexible connection.
   c. Measure static pressure across each component that makes up the air-handling system.
   d. Report artificial loading of filters at the time static pressures are measured.

3. Review Contractor-prepared shop drawings and Record drawings to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
4. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-heating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

D. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, speed, volts, amps, and static profile.
4. Mark all final settings.
5. Measure and record all operating data.
6. Record final fan-performance data.

3.7 DUCT LEAKAGE TESTS

A. Witness the duct leakage testing performed by Installer.

B. Verify that proper test methods are used and that leakage rates are within specified limits.

C. Report deficiencies observed.

3.8 HVAC CONTROLS VERIFICATION

A. In conjunction with system balancing, perform the following:

1. Verify HVAC control system is operating within the design limitations.
2. Confirm that the sequences of operation are in compliance with Contract Documents.
3. Verify that controllers are calibrated and function as intended.
4. Verify that controller set points are as indicated.
5. Verify the operation of lockout or interlock systems.
6. Verify the operation of valve and damper actuators.
7. Verify that controlled devices are properly installed and connected to correct controller.
8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.9 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent . If design value is less than 100 cfm, within 10 cfm.

2. Air Outlets and Inlets: Plus or minus 10 percent . If design value is less than 100 cfm, within 10 cfm.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.10 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Manufacturers' test data.
2. Field test reports prepared by system and equipment installers.
3. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents, including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans performance forms, including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.

b. Conditions of filters.
c. Cooling coil, wet- and dry-bulb conditions.
d. Heating coil, dry-bulb conditions.
e. Face and bypass damper settings at coils.
f. Fan drive settings, including settings and percentage of maximum pitch diameter.
g. Variable-frequency controller settings for variable-air-volume systems.
h. Settings for pressure controller(s).
i. Other system operating conditions that affect performance.

D. Air-Handling-Unit Test Reports: For air-handling units, include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Center-to-center dimensions of sheave and amount of adjustments in inches.
i. Number, type, and size of filters.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and speed.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan speed.
d. Inlet and discharge static pressure in inches wg.
e. For each filter bank, filter static-pressure differential in inches wg.
f. List for each internal component with pressure-drop, static-pressure differential in inches wg.
g. Outdoor airflow in cfm.
h. Return airflow in cfm.
i. Outdoor-air damper position.
j. Return-air damper position.

E. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

    a. System fan and air-handling-unit number.
    b. Location and zone.
    c. Traverse air temperature in deg F.
    d. Duct static pressure in inches wg.
    e. Duct size in inches.
    f. Duct area in sq. ft.
    g. Indicated airflow rate in cfm.
    h. Indicated velocity in fpm.
    i. Actual airflow rate in cfm.
    j. Actual average velocity in fpm.
    k. Barometric pressure in psig.

F. Instrument Calibration Reports:

1. Report Data:

    a. Instrument type and make.
    b. Serial number.
    c. Application.
    d. Dates of use.
    e. Dates of calibration.

3.11 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Commissioning Authority.

B. Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to the lesser of either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the TAB shall be considered incomplete and shall be rejected.

E. If recheck measurements find the number of failed measurements noncompliant with requirements indicated, proceed as follows:

1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection. All changes shall be tracked to show changes made to previous report.
2. If the second final inspection also fails, Owner may pursue others Contract options to

complete TAB work.

F. Prepare test and inspection reports.

END OF SECTION

SECTION 23 07 13
DUCT INSULATION

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Data: For adhesives, indicating VOC content.
3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
4. Product Data: For coatings, indicating VOC content.
5. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
6. Product Data: For sealants, indicating VOC content.
7. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.2 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers are to be marked with the manufacturer's name, appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.4 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.5 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors; Outdoors-Installed Insulation in Contact with Airstream: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials are to be applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Glass-Fiber Blanket: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 450 deg F in accordance with ASTM C411. Comply with ASTM C553, Type II, and ASTM C1290, Type III with factory-applied FSK jacket . Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Knauf Insulation.
c. Owens Corning.

2.3 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Glass-Fiber and Mineral Wool Adhesive: Glass-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Eagle Bridges - Marathon Industries.
    c. Foster Brand; H. B. Fuller Construction Products.

2. Verify fiberglass adhesive has a VOC content of 80 g/L or less when calculated in accordance with 40 CFR 59, Subpart D (EPA Method 24).
3. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.4 MASTICS AND COATINGS

A. Materials are compatible with insulation materials, jackets, and substrates.

1. VOC Content: 300 g/L or less.
2. Low-Emitting Materials: Verify mastic coatings comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.
4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C1136, Type II.
5. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested in accordance with ASTM E96/E96M, Procedure A, and complying with NFPA 90A and NFPA 90B.
6. ASJ+: All-service jacket composed of aluminum foil reinforced with glass scrim bonded to a kraft paper interleaving with an outer film leaving no paper exposed; complying with ASTM C1136, Types I, II, III, IV, and VII.
7. PSK Jacket: Aluminum foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C1136, Type II.

2.6 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C921, Type I, unless otherwise indicated.

2.7 SECUREMENTS

A. Insulation Pins and Hangers:

1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) AGM Industries, Inc.
      2) Gemco.
      3) Midwest Fasteners, Inc.

   b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   c. Spindle: Copper- or zinc-coated, low-carbon steel , fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
   d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

2. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Gemco.
      2) Midwest Fasteners, Inc.

   b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
   c. Spindle: Nylon, 0.106-inch- diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
   d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

3. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) AGM Industries, Inc.
2) Gemco.
3) Midwest Fasteners, Inc.

b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
c. Spindle: Copper- or zinc-coated, low-carbon steel , fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
d. Adhesive-backed base with a peel-off protective cover.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

2.8 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC in accordance with ASTM D1784, Class 16354-C. White or color-coded to match adjacent surface.

B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum in accordance with ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket .

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with Contract Documents.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

3.5 INSTALLATION OF GLASS-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

B. Comply with manufacturer's written installation instructions.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions. Adhesive may be omitted from top surface of horizontal ducts.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation

facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

C. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions. Adhesive may be omitted from top surface of horizontal ducts.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

    1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
    2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
    3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

    1. Draw jacket material smooth and tight.
    2. Install lap or joint strips with same material as jacket.
    3. Secure jacket to insulation with manufacturer's recommended adhesive.
    4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
    5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

    1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.7 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, concealed exhaust at exterior wall penetrations.
6. Indoor, exposed exhaust at exterior wall penetrations.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.8 REQUIRED INSULATION R-VALUES

A. Climate Zones 5 thru 8

1. Interior Ductwork

a. Supply Air and Return Air Ductwork - Minimum R-6

1) In instances where the difference between the air in the duct and the air outside the duct is always 15 degrees or less, no insulation is required.

b. Exhaust Air Ductwork (Last 15 feet prior to penetration of building exterior) - Minimum R-12
c. Outside Air Intake Ductwork - Minimum R-12

2. Exterior Ductwork

a. Supply Air and Return Air Ductwork - Minimum R-12
b. Exhaust Air Ductwork - Uninsulated
c. Outside Air Intake Ductwork - Uninsulated

3. Ductwork in Ventilated Attic Spaces

a. Supply Air and Return Air Ductwork - Minimum R-12
b. Exhaust Air Ductwork - Minimum R-12
c. Outside Air Intake Ductwork - Minimum R-12

3.9 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, round and flat-oval, supply-air, return air, exhaust air and outside air intake duct insulation is the following:

1. Glass-Fiber Blanket

B. Concealed, rectangular, supply-air, return air, exhaust air and outside air intake duct and plenum insulation is one of the following:

1. Glass-Fiber Blanket
2. Glass-Fiber Board

C. Exposed, round and flat-oval, supply-air, return air, exhaust air and outside air intake duct insulation is the following:

1. Glass-Fiber Pipe and Tank

D. Exposed, rectangular, supply-air, return air, exhaust air and outside air intake duct and plenum insulation is the following:

1. Glass-Fiber Board

3.10 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Ducts and Plenums, Concealed:

1. Multilayered Laminate
2. Aluminum, Corrugated : 0.024 inch thick with 3/16" Deep Corrugations.

D. Ducts and Plenums, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:

1. Multilayered Laminate
2. Aluminum, Corrugated : 0.024 inch thick with 3/16" Deep Corrugations.

E. Ducts and Plenums, Exposed, Larger Than 48 Inches in Diameter or with Flat Surfaces Larger Than 72 Inches:

1. Aluminum, Smooth with 4-by-1-Inch Box Ribs : 0.040 inch thick.

END OF SECTION

SECTION 23 07 19
HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied, if any).

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Data: For adhesives, mastics, and sealants, indicating VOC content.
3. Laboratory Test Reports: For adhesives, mastics, and sealants, indicating compliance with requirements for low-emitting materials.

1.2 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation system materials are to be delivered to the Project site in unopened containers. The packaging is to include name of manufacturer, fabricator, type, description, and size.

1.4 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.5 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing

identical products in accordance with ASTM E84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials are applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell, or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F and 220 deg F. Comply with ASTM C534/C534M, Type I, for tubular materials, Type II for sheet materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Aeroflex USA.
   b. Armacell LLC.
   c. K-Flex USA.

G. Glass-Fiber, Preformed Pipe: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 850 deg F in accordance with ASTM C411. Comply with ASTM C547.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. Knauf Insulation.
   c. Owens Corning.

2. Preformed Pipe Insulation: Type I, Grade A with factory-applied ASJ .
3. Fabricated shapes in accordance with ASTM C450 and ASTM C585.
4. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

H. Glass-Fiber, Pipe and Tank: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature between 35 deg F and 850 deg F, in accordance with ASTM C411. Comply with ASTM C1393.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. Knauf Insulation.
   c. Owens Corning.

2. Semirigid board material with factory-applied ASJ jacket.
3. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.3 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

2.4 MASTICS AND COATINGS

A. Materials are compatible with insulation materials, jackets, and substrates.

1. Mastics: As recommended by insulation manufacturer and with a VOC content of 50 g/L or less.
2. Verify mastics comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 LAGGING ADHESIVES

A. Adhesives comply with MIL-A-3316C, Class I, Grade A, and are compatible with insulation materials, jackets, and substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller Construction Products.
   c. Vimasco Corporation.

2. Verify adhesive is as recommended by insulation manufacturer and has a VOC content of 50 g/L or less.
3. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-

resistant lagging cloths over pipe insulation.
5. Service Temperature Range: 20 to plus 180 deg F .
6. Color: White.

2.6 SEALANTS

A. Materials are as recommended by the insulation manufacturer and are compatible with insulation materials, jackets, and substrates.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C1136, Type I, unless otherwise indicated.

2.9 SECUREMENTS

A. Staples: Outward-clinching insulation staples, nominal 3/4 inch wide, stainless steel or Monel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.

D. Install insulation with longitudinal seams at top and bottom (12 o'clock and 6 o'clock positions) of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with the Contract Documents.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of

strip, spaced 4 inches o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 4 inches o.c.
4. For below-ambient services, apply vapor-barrier mastic over staples.
5. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
6. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.

3.4 PENETRATIONS

A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles below.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and

Unions:

1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using prefabricated fitting insulation or mitered or routed fittings made from same material and density as that of adjacent pipe insulation. Each piece is butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with prefabricated fitting insulation or sectional pipe insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using prefabricated fitting insulation or sectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using prefabricated fitting insulation or sectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges, mechanical couplings, and unions using a section of oversized preformed pipe insulation to fit. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket, except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation conforms to the

following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as that of adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least 2 times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as that of pipe insulation. Where voids are difficult to fill with block insulation, fill the voids with a fibrous insulation material suitable for the specific operating temperature.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered or routed sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as that of pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install sections of pipe insulation and miter if required in accordance with manufacturer's written instructions.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated valve covers manufactured of same material as that of pipe insulation when available.
2. When prefabricated valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF GLASS-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with glass-fiber or mineral-wool blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When prefabricated sections are not available, install fabricated sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 INSTALLATION OF POLYISOCYANURATE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with tape or bands and tighten without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.

2. For insulation with jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic.
3. All insulation is tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, and same thickness as that of adjacent pipe insulation, not to exceed 1-1/2-inch thickness.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyisocyanurate block insulation of same thickness as that of pipe insulation. Where voids are difficult to fill with block insulation, fill the voids with a fibrous insulation material suitable for the specific operating temperature.

C. Insulation Installation on Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation. Secure according to manufacturer's written instructions.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of polyisocyanurate insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Insulation conductivity and thickness per pipe size comply with schedules in this Section or with requirements of authorities having jurisdiction, whichever is more stringent.

B. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

C. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation is one of the following:

a. Flexible Elastomeric: 1/2 inch thick.

b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

B. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation is the following:

a. Flexible Elastomeric: 1 inch thick.

C. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation is the following:

a. Flexible Elastomeric: 1 inch thick.

D. Refrigerant Liquid Piping:

1. All Pipe Sizes: Insulation is the following:

a. Flexible Elastomeric: 1 inch thick.

3.12 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation is one of the following:

a. Cellular Glass: 2 inches thick.
b. Flexible Elastomeric: 2 inches thick.

B. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation is the following:

a. Flexible Elastomeric: 2 inches thick.

C. Refrigerant Liquid Piping:

1. All Pipe Sizes: Insulation is one of the following:

a. Flexible Elastomeric: 1 inch thick.

3.13 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. None on piping located more than 8 feet above finished floor.
2. PVC : 30 mils thick on piping located less than 8 feet above finished floor.

3.14 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.
2. PVDC: 30 mils.

D. Piping, Exposed:

1. PVDC: 30 mils thick on insulation not likely subject to damage.
2. Aluminum, Stucco Embossed with Z-Shaped Locking Seam : 0.040 inch thick on insulation likely subject to damage.

END OF SECTION

SECTION 23 23 00
REFRIGERANT PIPING

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Sustainable Design Submittals:

1. Refrigerant: Product Data for refrigerants, indicating compliance with refrigerant management practices.

1.2 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.5 PRODUCT STORAGE AND HANDLING

A. Store piping with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 280, Type ACR.

B. Wrought-Copper Fittings, Solder-Joint: ASME B16.22.

C. Wrought-Copper Fittings, Brazed-Joint: ASME B16.50.

D. Wrought-Copper Unions: ASME B16.22.

E. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

F. Brazing Filler Metals: AWS A5.8/A5.8M.

G. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch-long assembly.
4. Working Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 deg F.

PART 3 - EXECUTION

3.1 VALVE AND SPECIALTY APPLICATIONS

A. Provide refrigerant locking caps on refrigerant charging ports that are located outdoors unless otherwise protected from unauthorized access by a means acceptable to the authority having jurisdiction.

3.2 INSTALLATION OF PIPING, GENERAL

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

K. Install refrigerant piping in protective conduit where installed belowground.

L. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

M. Slope refrigerant piping as follows:

1. Liquid lines may be installed level.

N. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

O. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

P. Identify refrigerant piping and valves according to Section 23 05 53 "Identification for HVAC Piping and Equipment."

3.3 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

F. Welded Joints: Construct joints according to AWS D10.12M/D10.12.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.4 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment" for hangers, supports, and anchor devices.

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer,

supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing , with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

D. Support horizontal piping within 12 inches of each fitting.

E. Support vertical runs of copper tubing to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in "Performance Requirements" Article.

   a. Fill system with nitrogen to the required test pressure.
   b. System shall maintain test pressure at the manifold gage throughout duration of test.
   c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
   d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

B. Prepare test and inspection reports.

3.6 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
2. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.

3.7 ADJUSTING

A. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

B. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open refrigerant valves except bypass valves that are used for other purposes.

END OF SECTION

SECTION 23 31 13
METAL DUCTS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Startup."

C. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

D. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.

B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards -

Metal and Flexible." All longitudinal seams shall be Pittsburgh lock seams unless otherwise specified for specific application.

1. Where specified for specific applications, all joints shall be welded.

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. McGill AirFlow LLC.
   b. MKT Metal Manufacturing.
   c. Sheet Metal Connectors, Inc.

B. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60 .
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

E. Tie Rods: Galvanized steel, 1/4-inch- minimum diameter for lengths 36 inches or less; 3/8-inch-minimum diameter for lengths longer than 36 inches.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches .
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. Verify sealant has a VOC content of 420 g/L or less.
11. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
8. Service: Indoor or outdoor.

9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. Verify sealant has a VOC content of 420 g/L or less.
9. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
10. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. Verify sealant has a VOC content of 420 g/L or less.
7. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

F. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

G. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.

B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths with fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed

to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

J. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.

K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

L. Elbows: Use long-radius elbows wherever they fit.

1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.
2. Fabricate 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.

M. Branch Connections: Use lateral or conical branch connections.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. Seal all ductwork to SMACNA Seal Class A with a maximum allowable SMACNA Leakage Class of 4.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 23 33 00 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
3. Testing of each duct section is to be performed with access doors, coils, filters, dampers,

and other duct-mounted devices in place as designed. No devices are to be removed or blanked off so as to reduce or prevent additional leakage.

4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness in accordance with "Description of Method 3 - NADCA Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

   a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.8 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use duct cleaning methodology as indicated in NADCA ACR.

C. Use service openings for entry and inspection.

1. Provide openings with access panels appropriate for duct static-pressure and leakage class at dampers, coils, and any other locations where required for inspection and cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 23 33 00 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

D. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

E. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

F. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
5. Provide drainage and cleanup for wash-down procedures.
6. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents in accordance with manufacturer's written instructions after removal of surface deposits and debris.

3.9 STARTUP

A. Air Balance: Comply with requirements in Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC."

3.10 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Fabricate all ducts to achieve SMACNA pressure class as indicated below.

B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units :

a. Pressure Class: Positive 2-inch wg.

C. Return Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units :

    a. Pressure Class: Positive or negative 2-inch wg.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

    a. Pressure Class: Negative 2-inch wg.

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Air-Handling Units :

    a. Pressure Class: Positive or negative 2-inch wg.

F. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

    a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
    b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
    c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

    a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

        1) Radius-to Diameter Ratio: 1.5.

    b. Round Elbows, 12Inches and Smaller in Diameter: Stamped or pleated.
    c. Round Elbows, 14Inches and Larger in Diameter: Standing seam or Welded.

G. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

    a. Rectangular Main to Rectangular Branch: 45-degree entry.
    b. Rectangular Main to Round Branch: Conical spin in or 45-degree boot tap.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical

Tees." Saddle taps are permitted in existing duct.

a. Velocity 1000 fpm or Lower: 90-degree tap.
b. Velocity 1000 to 1500 fpm: Conical tap.
c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For duct silencers, include pressure drop, dynamic insertion loss, and self-generated noise data. Include breakout noise calculations for high-transmission-loss casings.

1.2 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 90A and NFPA 90B.

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Greenheck Fan Corporation.
   b. Ruskin Company.
   c. United Enertech.

2. Performance:

   a. Leakage Rating Class III: Leakage not exceeding 40 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Construction:

   a. Linkage out of airstream.
   b. Suitable for horizontal or vertical airflow applications.

4. Frames:

    a. Hat-shaped, 16-gauge- thick, galvanized sheet steel .
    b. Mitered and welded corners.
    c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

    a. Multiple or single blade.
    b. Parallel- or opposed-blade design.
    c. Stiffen damper blades for stability.
    d. Galvanized steel; 16 gauge thick.

6. Blade Axles: Galvanized steel or Stainless steel .
7. Bearings:

    a. Oil-impregnated bronze or Molded synthetic .
    b. Dampers mounted with vertical blades to have thrust bearing at each end of every blade.

8. Tie Bars and Brackets: Galvanized steel.
9. Locking device to hold damper blades in a fixed position without vibration.

2.3 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    1. Aire Technologies, Inc.; a DMI company.
    2. Ruskin Company.
    3. United Enertech.

B. Duct-Mounted Access Doors: Fabricate access panels in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figure 7-2 (7-2M), "Duct Access Doors and Panels," and Figure 7-3, "Access Doors - Round Duct."

    1. Door:

        a. Double wall, rectangular.
        b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
        c. 24-gauge- thick galvanized steel door panel.
        d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
        e. Fabricate doors airtight and suitable for duct pressure class.

    2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.

        a. 24-gauge- thick galvanized steel frame.

3. Number of Hinges and Locks:

   a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
   b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
   c. Access Doors up to 24 by 48 Inches: Three hinges Continuous and two compression latches with outside and inside handles.
   d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.

2.4 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. CL WARD & Family Inc.
   2. Ductmate Industries, Inc; a DMI company.
   3. Ward Industries; a brand of Hart & Cooley, Inc.

B. Fire-Performance Characteristics: Adhesives, sealants, fabric materials, and accessory materials shall have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested in accordance with ASTM E84.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

D. Materials: Flame-retardant or noncombustible fabrics.

E. Coatings and Adhesives: Comply with UL 181, Class 1.

F. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

   1. Minimum Weight: 26 oz./sq. yd. .
   2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
   3. Service Temperature: Minus 40 to plus 200 deg F.

2.5 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A653/A653M.

   1. Galvanized Coating Designation: G60 .
   2. Exposed-Surface Finish: Mill phosphatized.

B. Stainless Steel Sheets: Comply with ASTM A480/A480M, Type 304, and having a No. 2 finish for concealed ducts and No. 4 finish for exposed ducts.

C. Aluminum Sheets: Comply with ASTM B209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, one-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B221, Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories in accordance with applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116 for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless steel accessories in stainless steel ducts, and aluminum accessories in aluminum ducts.

C. Where multiple damper sections are necessary to achieve required dimensions, provide reinforcement to fully support damper assembly when fully closed at full system design static pressure.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Where dampers are inaccessible, provide remote damper operators.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated and as needed for testing and balancing.

G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from control dampers, and equipment.
6. At each change in direction and at maximum 50-ft. spacing.
7. Upstream from turning vanes.
8. Control devices requiring inspection.
9. Elsewhere as indicated.

H. Install access doors with swing against duct static pressure.

I. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Head and Hand Access: 18 by 10 inches.

J. Label access doors according to Section 23 05 53 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

K. Install flexible connectors to connect ducts to equipment.

L. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors, and verify that size and location of access doors are adequate to perform required operation.
3. Inspect turning vanes for proper and secure installation, and verify that vanes do not move or rattle.
4. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION

SECTION 23 37 13.23
REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Register and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, airflow, NC rating and accessories furnished.

PART 2 - PRODUCTS

2.1 REGISTERS

A. Adjustable Blade Face Register:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Krueger-HVAC; brand of Johnson Controls International plc, Global Products.
   b. Price Industries.
   c. Titus; brand of Johnson Controls International plc, Global Products.

2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Horizontal spaced 3/4 inch apart.
5. Rear Blade Arrangement: Vertical spaced 3/4" apart.
6. Core Construction: Integral.
7. Frame: 1-1/4 inches wide.
8. Mounting: Countersunk screw.

2.2 GRILLES

A. Fixed Blade Face Grille:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Krueger-HVAC; brand of Johnson Controls International plc, Global Products.
   b. Price Industries.
   c. Titus; brand of Johnson Controls International plc, Global Products.

2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Horizontal spaced 3/4 inch apart, 35 degree deflection.
5. Core Construction: Integral.
6. Frame: 1-1/4 inches wide.
7. Mounting: Countersunk screw.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where registers and grilles are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install registers and grilles level and plumb.

B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 23 72 19
FIXED PLATE AIR-TO-AIR ENERGY RECOVERY UNITS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rated capacities, operating characteristics, furnished specialties, and accessories.

1.2 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-to-air energy recovery equipment to include in maintenance manuals.

1.3 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in a clean, dry place.

B. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.

C. Handle products carefully to prevent damage, breakage, denting, and scoring. Do not install damaged products.

D. Protect products from weather, dirt, dust, water, construction debris, and physical damage.

1. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.
2. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remover coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.
3. Replace installed products damaged during construction.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of air-to-air energy recovery equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Fixed-Plate Total Heat Exchangers: 10 years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by

a qualified testing agency, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of unit components.

C. ASHRAE Compliance:

1. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
2. Capacity ratings for air-to-air energy recovery equipment shall comply with ASHRAE 84, "Method of Testing Air-to-Air Heat/Energy Exchangers."

D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

E. Comply with ASTM E84.

2.2 CAPACITIES AND CHARACTERISTICS

A. Type: Fixed-plate total heat exchanger.

B. Exhaust Air:

1. Airflow: 500 cfm.
2. Summer:

a. Entering-Air Temperature, Dry Bulb: 85.5 deg F.
b. Entering-Air Temperature, Wet Bulb: 70.1 deg F.

3. Winter:

a. Entering-Air Temperature, Dry Bulb: 70 deg F.

4. Air Pressure Drop: 0.24 inches wg.

C. Supply Air:

1. Airflow: 500 cfm.
2. Summer:

a. Leaving-Air Temperature, Dry Bulb: 85.5 deg F.
b. Leaving-Air Temperature, Wet Bulb: 70 deg F.

3. Winter:

a. Leaving-Air Temperature, Dry Bulb: 52.8 deg F.

4. Air Pressure Drop: 0.04 inches wg.

D. Effectiveness: 74.5.

2.3 FIXED-PLATE TOTAL HEAT EXCHANGERS

A. Casing: Galvanized steel.

B. Plates: Evenly spaced, sealed, and arranged for counter airflow.

1. Plate Material and Coating: Chemically treated paper, or polymer on aluminum, with selective hydroscopicity, moisture permeability, and gas barrier properties.

2.4 SOURCE QUALITY CONTROL

A. AHRI 1060 Certification: Certified according to AHRI 1060.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixed-plate heat exchangers so supply and exhaust airstreams flow in opposite directions.

1. Install duct access doors in both supply and exhaust ducts, both upstream and downstream, for access to heat exchanger. Access doors and panels are specified in Section 233300 "Air Duct Accessories."

B. Equipment Mounting:

C. Install units with clearances for service and maintenance.

D. Comply with requirements for ductwork specified in Section 233113 "Metal Ducts."

3.3 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260529 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 250526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

3.4 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections :

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

B. Air-to-air energy recovery equipment will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that shipping, blocking, and bracing are removed.
3. Verify that unit is secure on mountings and supporting devices and that connections to electrical systems are complete. Verify that proper thermal-overload protection is installed.

B. Starting procedures for air-handling units include the following:

1. Measure and record motor electrical values for voltage and amperage.

3.7 ADJUSTING

A. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

3.8 CLEANING

A. After completing system installation and testing, adjusting, and balancing air-to-air heat recovery unit, and after completing startup service, clean unit to remove foreign material and construction dirt and dust.

3.9 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fixed-plate air-to-air energy recovery units.

END OF SECTION

SECTION 23 81 29
VARIABLE-REFRIGERANT-FLOW HVAC SYSTEMS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Air-Conditioning System Operation: System capable of operation with all zones in cooling only.

B. Heat-Pump System Operation: System capable of operation with all zones in either heating or cooling, but not with simultaneous heating and cooling zones that transfer heat between zones.

C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

D. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from HVAC equipment.

E. Two-Pipe System Design: One refrigerant vapor line and one refrigerant liquid line connect a single outdoor unit.

F. VRF: Variable refrigerant flow.

1.2 ACTION SUBMITTALS

A. Product Data: For each specified system and assembly, including components and accessories.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for indoor and outdoor units .
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
3. Include operating performance at design conditions and at extreme maximum and minimum outdoor ambient conditions.
4. Include description of system controllers, dimensions, features, control interfaces and connections, power requirements, and connections.
5. Include system operating sequence of operation in narrative form for each unique indoor- and outdoor-unit control.
6. Include description of control software features.
7. Include total refrigerant required and a comprehensive breakdown of refrigerant required by each system installed.
8. Include refrigerant type and data sheets showing compliance with requirements indicated.
9. For system design software.
10. Indicate location and type of service access.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For VRF HVAC system components.

B. Field Quality Control Reports: For specified tests and inspections.

C. Qualification Statements:

1. For Installer: Certificate from VRF HVAC system manufacturer certifying that Installer has successfully completed prerequisite training administered by manufacturer for proper installation of systems, including but not limited to, equipment, piping, controls, and accessories indicated and furnished for installation.

    a. Retain copies of Installer certificates on-site and make available on request.

2. For VRF HVAC system manufacturer.
3. For VRF HVAC system provider.

D. Sample Warranties: For specified special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For VRF HVAC systems.

B. Manufacturer Qualifications:

1. Nationally recognized manufacturer of VRF HVAC systems and products.
2. Having complete published catalog literature, installation, and operation and maintenance manuals for all products intended for use.
3. Having full-time in-house employees for the following:

    a. Product research and development.
    b. Product and application engineering.
    c. Product manufacturing, testing, and quality control.
    d. Technical support for system installation training, startup, commissioning, and troubleshooting of installations.
    e. Owner training.

C. Factory-Authorized Service Representative Qualifications:

1. Authorized representative of, and trained by, VRF HVAC system manufacturer.
2. Staffing resources of competent and experienced full-time employees that are assigned to execute work according to schedule.
3. Service and maintenance staff assigned to support Project during warranty period.
4. Product parts inventory to support ongoing system operation for a period of not less than five years after Substantial Completion.
5. VRF HVAC system manufacturer's backing to take over execution of Work if necessary to comply with requirements indicated. Include Project-specific written letter, signed by

manufacturer's corporate officer, if requested.

D. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by VRF HVAC system manufacturer.

1. Each employee must be certified by manufacturer for proper installation of systems, including, but not limited to, equipment, piping, controls, and accessories indicated and furnished for installation.
2. Installer certification must be valid and current for duration of Project.
3. Retain copies of Installer certificates on-site and make available on request.
4. Each person assigned to Project must have demonstrated past experience.

E. ISO Compliance: System equipment and components furnished by VRF HVAC system manufacturer are to be manufactured in an ISO 9001 and ISO 14001 facility.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in a clean and dry place.

B. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.

C. Handle products carefully to prevent damage, breaking, denting, and scoring. Do not install damaged products.

D. Protect products from weather, dirt, dust, water, construction debris, and physical damage.

1. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.
2. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remove coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.

E. Replace installed products damaged during construction.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace equipment and components that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period:

a. For Compressor: Seven year

b. For Parts, Including Controls: Five year

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Service Access:

1. Provide and document service access requirements.
2. Locate equipment, system isolation valves, and other system components that require service and inspection in easily accessible locations. Avoid locations that are difficult to access if possible.
3. Where serviceable components are installed behind walls and above inaccessible ceilings, provide finished assembly with access doors or panels to gain access. Properly size the openings to allow for service, removal, and replacement.
4. If less than full and unrestricted access is provided, locate components within an 18-inch reach of the finished assembly.
5. Where ladder access is required to service elevated components, provide an installation that provides for sufficient access within ladder manufacturer's written instructions for use.
6. Comply with OSHA regulations.

B. System Design and Installation Requirements:

1. Design and install systems indicated in accordance with manufacturer's written instructions.
2. Where manufacturer's requirements differ from requirements indicated, contact Architect for direction. The most stringent requirements should apply unless otherwise directed in writing by Architect.

C. Isolation of Equipment: Provide isolation valves to isolate each indoor unit and outdoor unit for service, removal, and replacement without interrupting system operation.

D. System Capacity Ratio: The sum of connected capacity of all indoor units is to be within the following range of outdoor-unit rated capacity:

1. Range acceptable to manufacturer.

E. System Turndown: Stable operation down to 20 percent of outdoor-unit capacity.

F. System Auto Refrigerant Charge: Each system is to have an automatic refrigerant charge function to ensure the proper amount of refrigerant is installed in system.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. AHRI Compliance: System and equipment performance certified in accordance with AHRI 1230.

I. ASHRAE Compliance:

1. ASHRAE 15: For safety code for mechanical refrigeration.
2. ASHRAE 62.1: For indoor air quality.
3. ASHRAE 135: For control network protocol with remote communication.
4. ASHRAE/IES 90.1: For system and component energy efficiency.

J. UL Compliance: Comply with UL 1995.

K. Outdoor Conditions:

1. Suitable for outdoor ambient conditions encountered.

a. Design equipment and supports to withstand wind loads of governing code and ASCE/SEI 7.
b. Design equipment and supports to withstand snow and ice loads of governing code and ASCE/SEI 7.
c. Provide corrosion-resistant coating for components and supports where located in coastal or industrial climates that are known to be harmful to materials and finishes.

L. Sound Performance: Sound levels generated by operating HVAC equipment must be within requirements indicated.

1. Indoor: Within design guidelines of "2023 ASHRAE Handbook - HVAC Applications."
2. Outdoor: Within ordinance of governing authorities.

M. Thermal Movements: Allow for controlled thermal movements from ambient, surface, and system temperature changes.

N. Capacities and Characteristics: As indicated on Drawings.

2.2 VRF HVAC SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Daikin Applied
2. Mitsubishi Electric Cooling and Heating
3. Trane Inc.

B. Source Limitations: Obtain products from single source from single manufacturer including, but not limited to, the following:

1. Indoor and outdoor units, including accessories.
2. Controls and software.
3. Refrigerant isolation valves.
4. Specialty refrigerant pipe fittings.

C. System Description: Direct-expansion outdoor unit

1. Two-pipe system design.

2. System heat pump as indicated on Drawings.
3. Each system has one refrigerant circuit shared by all indoor units connected to system.

D. VRF Indoor Units:

1. VRF Indoor Unit - Suspended, Ceiling-Mounted:

a. Description: Factory-assembled complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.
b. Cabinet:

1) Material: Painted steel, or coated steel frame covered by a plastic cabinet, with an architectural acceptable finish suitable for tenant occupancy on exposed surfaces.
2) Insulation: Manufacturer's standard internal insulation , complying with ASHRAE 62.1, to provide thermal resistance and prevent condensation.
3) Mounting: Manufacturer-designed provisions for field installation.
4) Internal Access: Removable panels of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

c. DX Coil Assembly:

1) Coil Casing: Aluminum, galvanized, or stainless steel.
2) Coil Fins: Aluminum, mechanically bonded to tubes, with arrangement required by performance.
3) Coil Tubes: Copper, of diameter and thickness required by performance.
4) Expansion Valve: Electronic modulating type with linear or proportional characteristics.
5) Internal Tubing: Copper tubing with brazed joints.
6) Internal Tubing Insulation: Manufacturer's standard insulation, of thickness to prevent condensation.
7) Field Piping Connections: Manufacturer's standard.
8) Factory Charge: Dehydrated air or nitrogen.
9) Testing: Factory pressure tested and verified to be without leaks.

d. Drain Assembly:

1) Pan: Non-ferrous material, with bottom sloped to low point drain connection.
2) Condensate Removal: Gravity.

a) If a floor drain is not available at unit, provide unit with field-installed condensate pump accessory.

3) Field Piping Connection: Non-ferrous material .

e. Fan and Motor Assembly:

1) Fan(s):

a) Direct-drive arrangement.
b) Single or multiple fans connected to a common motor shaft and driven by a single motor.
c) Fabricated from non-ferrous components or ferrous components with corrosion protection finish.
d) Wheels statically and dynamically balanced.

2) Motor: Brushless dc or electronically commutated with permanently lubricated bearings.
3) Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.
4) Speed Settings and Control: Two (low, high), three (low, medium, high), or more than three speed settings or variable speed with a speed range of least 50 percent.
5) Vibration Control: Integral isolation to dampen vibration transmission.

f. Filter Assembly:

1) Access: Front, to accommodate filter replacement without the need for tools.
2) Efficiency: MERV 13.
3) Washable Media: Manufacturer's standard filter with antimicrobial treatment.

g. Unit Accessories:
1) Condensate Pump: Integral reservoir and control with electrical power connection through unit power.

h. Unit Controls:

1) Enclosure: Manufacturer's standard, and suitable for indoor locations.
2) Factory-Installed Controller: Configurable digital control.
3) Factory-Installed Sensors: Unit inlet air temperature.

i. Features and Functions: Self-diagnostics, time delay, auto-restart , auto operation mode , manual operation mode , filter service notification , drain-assembly, high-water-level safety shutdown and notification , run test switch.
j. Cable and Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
k. Field Connection: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
l. Unit Electrical:

1) Enclosure: Manufacturer's standard, and suitable for indoor locations.
2) Field Connection: Single-point connection to power entire unit and integral controls.
3) Disconnecting Means: Factory-mounted circuit breaker or switch, complying with NFPA 70.
4) Control Transformer: Manufacturer's standard. Coordinate requirements

with field power supply.

5) Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
6) Raceways: Enclose line voltage wiring in raceways to comply with NFPA 70.

E. VRF Outdoor Units:

1. VRF Outdoor Unit - Air-Source Heat Pump:

a. Description: Factory-assembled and -tested complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

1) Specially designed for use in systems with either all heating or all cooling demands, but not for use in systems with simultaneous heating and cooling.
2) Systems are to consist of one unit, or multiple unit modules that are designed by variable refrigerant system manufacturer for field interconnection to make a single refrigeration circuit that connects multiple indoor units.
3) All units installed are to be from the same product development generation.

b. Cabinet:

1) Galvanized steel and coated with a corrosion-resistant finish.
2) Mounting: Manufacturer-designed provisions for field installation.
3) Internal Access: Removable panels or hinged doors of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

c. Compressor and Motor Assembly:

1) One or more positive-displacement, direct-drive and hermetically sealed scroll compressor 15 percent of rated capacity.
2) Protection: Integral protection against the following:

a) High refrigerant pressure.
b) Low oil level.
c) High oil temperature.
d) Thermal and overload.
e) Voltage fluctuations.
f) Phase failure and phase reversal.
g) Short cycling.

3) Speed Control: Variable to automatically maintain refrigerant suction and condensing pressures while varying refrigerant flow to satisfy system cooling and heating loads.
4) Vibration Control: Integral isolation to dampen vibration transmission.

d. Condenser Coil Assembly:

1) Plate Fin Coils:

a) Casing: Aluminum, galvanized, or stainless steel.
b) Fins: Aluminum or copper, mechanically bonded to tubes, with arrangement required by performance.
c) Tubes: Copper, of diameter and thickness required by performance.

2) Coating: Corrosion resistant.
3) Hail Protection: Provide condenser coils with louvers, baffles, or hoods to protect against hail damage.

e. Condenser Fan and Motor Assembly:

1) Fan(s): Propeller type.

a) Direct-drive arrangement.
b) Fabricated from non-ferrous components or ferrous components with corrosion protection finish to match performance indicated for condenser coil.
c) Dynamically and statically balanced.

2) Fan Guards: Removable safety guards complying with OSHA regulations. If using metal materials, coat with corrosion-resistant coating to match performance indicated for condenser coil.
3) Motor(s): Brushless dc or electronically commutated with permanently lubricated bearings and rated for outdoor duty.
4) Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.
5) Speed Settings and Control: Variable speed with a speed range of least 75 percent.
6) Vibration Control: Integral isolation to dampen vibration transmission.

f. Drain Pan: If required by manufacturer's design, provide unit with non-ferrous drain pan with bottom sloped to a low point drain connection.

g. Unit Controls:

1) Enclosure: Manufacturer's standard, and suitable for unprotected outdoor locations.
2) Factory-Installed Controller: Configurable digital control.
3) Factory-Installed Sensors:

a) Refrigerant suction temperature.
b) Refrigerant discharge temperature.
c) Outdoor air temperature.
d) Refrigerant high pressure.
e) Refrigerant low pressure.
f) Oil level.

h. Features and Functions: Self-diagnostics, time delay, auto-restart, fuse protection, auto operation mode , manual operation mode , night setback control , run test switch.
i. Communication: Network communication with indoor units and other outdoor unit(s).
j. Cable and Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
k. Field Connection: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
l. Unit Electrical:

1) Enclosure: Metal, similar to enclosure, and suitable for unprotected outdoor locations.
2) Field Connection: Single-point connection to power entire unit and integral controls.
3) Disconnecting Means: Factory-mounted circuit breaker or switch, complying with NFPA 70.
4) Control Transformer: Manufacturer's standard. Coordinate requirements with field power supply.
5) Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
6) Raceways: Enclose line voltage wiring in raceways to comply with NFPA 70.

m. Unit Hardware: Zinc-plated steel, or stainless steel. Coat exposed surfaces with additional corrosion-resistant coating if required to prevention corrosion when exposed to salt spray test for 1000 hours in accordance with ASTM B117.
n. Unit Piping:

1) Unit Tubing: Copper tubing with brazed joints.
2) Unit Tubing Insulation: Manufacturer's standard insulation, of thickness to prevent condensation.
3) Field Piping Connections: Manufacturer's standard.
4) Factory Charge: Dehydrated air or nitrogen.
5) Testing: Factory pressure tested and verified to be without leaks.

F. System Controls:

1. General Requirements:

a. Network: Indoor units and outdoor units shall include integral controls and connect through a manufacturer-selected control network.
b. Network Communication Protocol: Manufacturer proprietary control communication between interconnected units.
c. Operator Interface:

1) Operator interface with system and unit controls is to be through the following:

a) Operator interfaces integral to controllers.

2) Users interface with controllers for indoor units control to extent privileges are to be enabled. Control features available to users are to include the following:

a) On/off control.
b) Temperature set-point adjustment.

2. Wired Controllers for Indoor Units:

a. Auto Timeout Touch Screen LCD: Timeout duration shall be adjustable.
b. Temperature Units: Fahrenheit and Celsius.
c. On/Off: Turns indoor unit on or off.
d. Hold: Hold operation settings until hold is released.
e. Operation Mode: Cool, Heat, Auto, Dehumidification, Fan Only, and Setback.
f. Temperature Display: 1-degree increments.
g. Relative Humidity Display: 1 percent increments.
h. Fan Speed Setting: Select between available options furnished with the unit.
i. Airflow Direction Setting: If applicable to unit, select between available options furnished with the unit.
j. Auto Off Timer: Operates unit for an adjustable time duration and then turns unit off.
k. Occupancy detection.
l. Service Notification Display: "Filter”.
m. Service Run Tests: Limit use by service personnel to troubleshoot operation.
n. Error Code Notification Display: Used by service personnel to troubleshoot abnormal operation and equipment failure.
o. User and Service Passwords: Capable of preventing adjustments by unauthorized users.
p. Setting stored in nonvolatile memory to ensure that settings are not lost if power is lost. Battery backup for date and time only.
q. Low-voltage power required for controller is to be powered through non-polar connections to indoor unit.

G. System Refrigerant and Oil:

1. Refrigerant: As required by VRF HVAC system manufacturer for system to comply with performance requirements indicated.

a. Classification: ASHRAE 34, 2024.
b. Type: R-454b.

2. Oil: As required by VRF HVAC system manufacturer and to comply with performance requirements indicated.

2.3 VRF SYSTEM CONDENSATE DRAIN PIPING

A. Copper Tube:

1. Drawn-Temper Tubing: Complying with ASTM B88, Type L or Type DWV complying with ASTM B306.
2. Wrought-Copper Fittings: ASME B16.22.
3. Wrought-Copper Unions: ASME B16.22.
4. Solder Filler Metals: ASTM B32, lead-free alloys, and water-flushable flux complying with ASTM B813.

B. CPVC Plastic Pipe: Complying with ASTM F441/F441M, Schedule 40, with socket-type pipe fittings complying with ASTM F438 and solvent cement complying with ASTM F493.

C. PVC Plastic Pipe: Complying with ASTM D1785, Schedule 40, with socket-type pipe fittings complying with ASTM D2466 and solvent cement in accordance with ASTM D2564, primer complying with ASTM F656.

2.4 SYSTEM REFRIGERANT PIPING

A. Comply with requirements in Section 232300 "Refrigerant Piping" for system piping requirements.

B. Refrigerant Piping, Valves, and Fittings:

1. Copper Tube: ASTM B280, Type ACR.
2. Wrought-Copper Fittings, Brazed Joints: ASME B16.50.
3. Brazing Filler Metals: AWS A5.8/A5.8M.
4. Refrigerant Tubing Kits:

   a. Furnished by VRF HVAC system manufacturer.
   b. Factory-rolled and -bundled, soft-copper tubing with tubing termination fittings at each end.
   c. Standard one-piece length for connecting to indoor units.
   d. Pre-insulated with flexible elastomeric insulation of thickness to comply with governing energy code and sufficient to eliminate condensation.
   e. Factory Charge: Dehydrated air or nitrogen.

C. Divided-Flow Specialty Fittings: Where required by VRF HVAC system manufacturer for proper system operation, VRF HVAC system manufacturer is to furnish specialty fittings with identification and instructions for proper installation by Installer.

D. Refrigerant Isolation Ball Valves: Uni-body full port design, rated for maximum system temperature and pressure, and factory tested under pressure to ensure tight shutoff. Designed for valve operation without removing seal cap.

1. Seals: Compatible with system refrigerant and oil. Seal service life of at least 20 years.
2. Valve Connections: Flare or sweat, depending on size.

2.5 METAL HANGERS AND SUPPORTS

A. See Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for metal hangers and supports.

B. Copper Tube Hangers: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

1. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized or copper-coated steel.

C. Plastic Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, galvanized-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel.

2.6 METAL STRUT SUPPORT SYSTEMS

A. Strut Support System - Metal, Rod Type:

1. Description: Factory-fabricated pipe-support assembly made of steel channels, vertical metal support rods, accessories, fittings, and other components for supporting multiple parallel pipes.
2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Struts: Continuous slotted carbon steel.
4. Strut Width: Selected for applicable load criteria.
5. Strut Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel.
7. Metallic Coating: Plain.

2.7 EQUIPMENT STANDS, OUTDOOR TYPE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. DiversiTech Corp.
2. MIRO Industries Inc.
3. RectorSeal HVAC; a CSW Industrials Company

B. Description: Individual foot supports with elevated adjustable channel cross bars and clamps/fasteners/bolts for ground or roof-supported outdoor equipment components, without roof membrane penetration, in a prefabricated system that can be modularly assembled on-site.

C. Foot Material: Rubber or polypropylene.

D. Rails Material: Hot-dip galvanized carbon steel.

2.8 MISCELLANEOUS SUPPORT MATERIALS

A. Grout: ASTM C1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000 psi, 28-day compressive strength.

B. Structural Steel: ASTM A36/A36M, carbon steel plates, shapes, and bars; galvanized.

C. Threaded Rods: Continuously threaded. Zinc-plated steel or galvanized steel for indoor applications and stainless steel for outdoor applications. Mating nuts and washers of similar material as rods.

2.9 PIPING AND TUBING INSULATION

A. Comply with requirements in Section 230719 "HVAC Piping Insulation" for system piping insulation requirements.

B. Condensate Drain Piping and Tubing Insulation and Jacket Requirements:

1. Flexible Elastomeric Insulation:

a. Closed-cell, sponge- or expanded-rubber materials, complying with ASTM C534, Type I for tubular materials.
b. Indoors: 1/2 inch thick.
c. Outdoors: 1/2 inch thick.

2. Field-Applied Jacket:

a. Concealed: None required.
b. Indoors, Exposed to View: PVC, 20 mils thick.
c. Outdoors, Exposed to View: Aluminum, smooth, 0.020 inch thick.

C. Refrigerant Tubing Insulation and Jacket Requirements:

1. Pipe Insulation - Flexible Elastomeric:

a. Closed-cell, sponge- or expanded-rubber materials, complying with ASTM C534, Type I for tubular materials.
b. Indoors: 1 inch thick.
c. Outdoors: 1 inch thick.

2. Field-Applied Jacket:

a. Concealed: None required.
b. Indoors, Exposed to View: None required.
c. Outdoors, Exposed to View: Aluminum, smooth, 0.020 inch thick.

D. Flexible Elastomeric Insulation Adhesive: Comply with MIL-A-24179A, Type II, Class I.

E. PVC Jacket Adhesive: Compatible with PVC jacket.

F. Metal Jacket Flashing Sealants:

1. Materials are to be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.

2.10 SYSTEM CONTROL CABLE

A. Low-Voltage Control Cabling:

1. Paired Cable: NFPA 70, Type CMG.

   a. One pair, twisted, 16 AWG, stranded (19x29) or 18 AWG, stranded (19x30) tinned-copper conductors as required by VRF HVAC system manufacturer.
   b. PVC insulation.
   c. Braided or foil shielded.
   d. PVC jacket.
   e. Flame Resistance: Comply with UL 1685.

B. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems" for cable raceways.

2.11 MATERIALS

A. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A240/A240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A653/A653M.

D. Aluminum: ASTM B209.

2.12 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect factory-assembled equipment.

1. Equipment will be considered defective if it does not pass tests and inspections.

B. Prepare test and inspection reports for historical record. Submit reports only if requested.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine products before installation. Reject products that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for piping and tubing to verify actual locations of connections before equipment installation.

D. Examine roughing-in for ductwork to verify actual locations of connections before equipment installation.

E. Examine roughing-in for wiring and conduit to verify actual locations of connections before equipment installation.

F. Examine walls, floors, roofs, and outdoor pads for suitable conditions where equipment will be installed.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF VRF HVAC SYSTEMS, GENERAL

A. Clearance:

1. Maintain manufacturer's recommended clearances for service and maintenance.
2. Maintain clearances required by governing code.

B. Loose Components: Install components, devices, and accessories furnished by manufacturer, with equipment, that are not factory mounted.

3.3 INSTALLATION OF VRF HVAC SYSTEMS

A. Installation of VRF Indoor Units:

1. Install units to be level and plumb while providing a neat and finished appearance.
2. Unless otherwise required by VRF HVAC system manufacturer, support ceiling-mounted units from structure above using threaded rods; minimum rod size of 3/8 inch.
3. Adjust supports of exposed and recessed units to draw units tight to adjoining surfaces.
4. Protect finished surfaces of ceilings, floors, and walls that come in direct contact with units. Refinish or replaced damaged areas after units are installed.
5. In rooms with ceilings, conceal piping and tubing, controls, and electrical power serving units above ceilings.
6. In rooms without ceiling, arrange piping and tubing, controls, and electrical power serving units to provide a neat and finished appearance.
7. Provide lateral bracing if needed to limit movement of suspended units to not more

than 0.25 inch.

8. For floor- and wall-mounted units that are exposed, conceal piping and tubing, controls, and electrical power serving units within walls.
9. Attachment: Install hardware for proper attachment to supported equipment.

B. Installation of Duct, Accessories, and Air Outlets:

1. Where installing ductwork adjacent to equipment, allow space for service and maintenance.
2. Comply with requirements for metal ducts specified in Section 233113 "Metal Ducts."
3. Comply with requirements for air duct accessories specified in Section 233300 "Air Duct Accessories."
4. Comply with requirements for flexible ducts specified in Section 233346 "Flexible Ducts."
5. Comply with requirements for registers and grilles specified in Section 233713.23 "Registers and Grilles."

C. Installation of VRF Outdoor Units:

1. Install units to be level and plumb while providing a neat and finished appearance.
2. Install outdoor units on support structures indicated on Drawings.

3.4 INSTALLATION OF PIPING, GENERAL

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping and tubing systems. Install piping and tubing as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping and tubing in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping and tubing at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping and tubing above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping and tubing to permit valve servicing.

F. Install piping and tubing at indicated slopes.

G. Install piping and tubing free of sags.

H. Install fittings for changes in direction and branch connections.

I. Install piping and tubing to allow application of insulation.

J. Install groups of pipes and tubing parallel to each other, spaced to permit applying insulation with service access between insulated piping and tubing.

K. Install sleeves for piping and tubing penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230500 "Common Work Results for HVAC."

3.5 INSTALLATION OF VRF SYSTEM CONDENSATE DRAIN PIPING

A. General Requirements for Drain Piping and Tubing:

1. Install a union in piping at each threaded unit connection.
2. Install an adjustable stainless steel hose clamp with adjustable gear operator on unit hose connections. Tighten clamp to provide a leak-free installation.
3. If required for unit installation, provide a trap assembly in drain piping to prevent air circulated through unit from passing through drain piping. Comply with more stringent of the following:

    a. Details indicated on Drawings.
    b. Manufacturer's requirements.
    c. Governing codes.
    d. In the absence of requirements, comply with requirements in ASHRAE handbooks.

4. Extend drain piping from units with drain connections to drain receptors as indicated on Drawings. If not indicated on Drawings, terminate drain connection at nearest accessible location that is not exposed to view by occupants.
5. Provide each 90-degree change in direction with a Y- or T-fitting. Install a threaded plug connection in the dormant side of fitting or future use as a service cleanout.

B. Gravity Drains:

1. Slope piping from unit connection toward drain termination at a constant slope of not less than one percent.

C. Pumped Drains:

1. If unit condensate pump or lift mechanism is not included with an integral check valve, install a full-size check valve in each branch pipe near unit connection to prevent backflow into unit.

3.6 INSTALLATION OF SYSTEM REFRIGERANT PIPING

A. Refrigerant Tubing Kits:

1. Unroll and straighten tubing to suit installation. Deviations in straightness of exposed tubing are to be unnoticeable to observer.
2. Support tubing using hangers and supports indicated at intervals not to exceed 5 ft.. Minimum rod size, 1/4 inch.
3. Prepare tubing ends and make mating connections to provide a pressure-tight and leak-free installation.

B. Install refrigerant piping in accordance with ASHRAE 15 and governing codes.

C. Select system components with pressure rating equal to or greater than system operating

pressure.

D. Install piping as short and direct as possible, with a minimum number of joints and fittings.

E. Arrange piping to allow inspection and service of equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance are concealed behind finished surfaces.

F. Install refrigerant piping and tubing in rigid or flexible conduit in locations where exposed to mechanical damage.

G. Unless otherwise required by VRF HVAC system manufacturer, slope refrigerant piping and tubing as follows:

1. Install horizontal hot-gas discharge piping and tubing with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps to entrain oil in vertical runs.
4. Liquid lines may be installed level.

H. When brazing, remove or protect components that could be damaged by heat.

I. Before installation, clean piping, tubing, and fittings to cleanliness level required by VRF HVAC system manufacturer.

J. Joint Construction:

1. Ream ends of tubes and remove burrs.
2. Remove scale, slag, dirt, and debris from inside and outside of tube and fittings before assembly.
3. Construct joints in accordance with AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

a. Use Type BCuP (copper-phosphorus) alloy for joining copper fittings with copper tubing.
b. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze.

3.7 INSTALLATION OF METAL HANGERS AND SUPPORTS

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

C. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

D. Install lateral bracing with pipe hangers and supports to prevent swaying.

E. Install building attachments within concrete slabs or attach to structural steel.

1. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

F. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

G. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

H. Piping and Tubing Insulation:

1. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields are to span an arc of 180 degrees.
2. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches long and 0.048 inch thick.

I. Horizontal-Piping Hangers and Supports: Install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
3. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
4. Multiple horizontal pipes located indoors may use metal framing systems with split clamp attachment for each pipe in lieu of individual clevis hangers.
5. Pipe stands for horizontal pipes located outdoors.
6. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
7. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.

J. Horizontal Piping Hanger Spacing and Rod Size: Install hangers for drawn-temper copper piping with the following maximum horizontal spacing and minimum rod sizes:

1. Sizes through NPS 3/4 (DN 20): Maximum span, 5 ft.; minimum rod size, 1/4 inch.

K. Plastic Pipe Hanger and Support Spacing:

1. Space hangers and supports in accordance with pipe manufacturer's written instructions for service conditions.
2. Maximum spacing, 5 ft.; minimum rod size, 1/4 inch.

L. Vertical-Piping Clamps: Install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): If longer ends are required for riser clamps.

M. Support vertical runs at roof, at each floor, and at midpoint intervals between floors, not to exceed 5 ft..

N. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified.

O. Use hangers, supports, and attachments with galvanized coatings unless otherwise indicated.

P. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

Q. Trim excess length of continuous-thread hanger and support rods to 1 inch.

R. Hanger-Rod Attachments: Install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

S. Building Attachments: Install the following types:

1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
4. C-Clamps (MSS Type 23): For structural shapes.
5. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
6. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.

7. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
8. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
9. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

3.8 INSTALLATION OF METAL STRUT SUPPORT SYSTEMS

A. Metal Strut Support System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

B. Comply with MFMA-103 for metal framing system selections and applications that are not specified.

3.9 INSTALLATION OF PIPING AND TUBING INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated. Installation to maintain a continuous vapor barrier.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are unavailable, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

E. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended in writing by insulation manufacturer. Secure jacket with stainless steel bands 12 inches o.c. and at end joints.

3.10 ELECTRICAL CONNECTIONS

A. Comply with requirements indicated on Drawings and in applicable Division 26 Sections.

B. To extent electrical power is required for system equipment, components, and controls, and is not indicated on Drawings and addressed in the Specifications, the design for such electrical power is to be delegated to VRF HVAC system provider.

1. Delegated design of electrical power to equipment, components and controls, and associated installation is to be included at no additional cost to Owner.

C. Connect field electrical power source to each separate electrical device requiring field electrical power. Coordinate termination point and connection type with Installer.

D. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

E. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding connections.

F. Install nameplate or acrylic label with self-adhesive back for each electrical connection indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate is to be laminated phenolic layers of black with engraved white letters. Letters at least 1/2 inch high.
2. Locate nameplate or label where easily visible.

G. Install manufactured conduit sweeps and long-radius elbows if possible.

H. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

3.11 INSTALLATION OF SYSTEM CONTROL CABLE

A. Comply with NECA 1.

B. Installation Method:

1. Install cables in raceways except as follows:

a. Within equipment and associated control enclosures.
b. In accessible ceiling spaces where open cable installation method may be used.

2. Conceal raceway and cables except in unfinished spaces.

C. General Requirements for Cabling:

1. Comply with TIA-568.2-D.
2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
3. Terminate all conductors; no cable is to contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables must be continuous from terminal to terminal. Do not splice cable.
5. Cables serving a common system may be grouped in a common raceway. Install control cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
6. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.

10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
11. Support: Do not allow cables to lie on removable ceiling tiles or access panels.
12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
13. Provide strain relief.
14. Keep runs short. Allow extra length for connecting to terminals.
15. Do not bend cables in a radius less than 10 times the cable OD.
16. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
17. Ground wire is to be copper, and grounding methods shall comply with IEEE C2. Demonstrate ground resistance.

D. Balanced Twisted-Pair Cable Installation:

1. Comply with TIA-568.2-D.
2. Do not untwist balanced twisted-pair cables more than 1/2 inch at the point of termination to maintain cable geometry.

E. Open-Cable Installation:

1. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
2. Do not route cable through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.

F. Separation from EMI Sources: Comply with BICSI TDMM and TIA-569-E recommendations for separating unshielded cable from potential EMI sources including electrical power wiring and equipment.

3.12 GROUNDING

A. For low-voltage control cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.13 IDENTIFICATION

A. Identify system equipment, piping, tubing, and valves. Comply with requirements for identification specified in Section 230553 "Identification for HVAC Piping and Equipment."

B. Identify system electrical and controls components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Identify each control cable on each end and at each terminal with a number-coded identification tag. Provide a unique tag for each cable.

3.14 FIELD QUALITY CONTROL

A. Refrigerant Tubing Positive Pressure Testing:

1. Comply with more stringent of VRF HVAC system manufacturer's requirements and requirements indicated.
2. After completion of tubing installation, pressurize tubing systems to a test pressure of not less than 1.2 times VRF HVAC system operating pressure, but not less than 600 psig, using dry nitrogen.
3. Successful testing is to show test pressure is maintained for a continuous and uninterrupted period of 24 hours. Allowance for pressure changes attributed to changes in ambient temperature are acceptable.
4. Prepare test report to record information for each test as follows:

    a. Name of person starting test, company name, phone number, and e-mail address.
    b. Name of manufacturer's service representative witnessing test, company name, phone number, and e-mail address.
    c. Detailed description of extent of tubing tested.
    d. Date and time at start of test.
    e. Test pressure at start of test.
    f. Outdoor temperature at start of test.
    g. Name of person ending test, company name, phone number, and e-mail address.
    h. Date and time at end of test.
    i. Test pressure at end of test.
    j. Outdoor temperature at end of test.
    k. Remarks:

5. Submit test reports for Project record.

B. Refrigerant Tubing Evacuation Testing:

1. Comply with more stringent of VRF HVAC system manufacturer's requirements and requirements indicated.
2. After completion of tubing positive-pressure testing, evacuate tubing systems to a pressure of 500 microns.
3. Successful testing is to show test pressure is maintained for a continuous and uninterrupted period of one hour
4. Prepare test report to record information for each test as follows:

    a. Name of person starting test, company name, phone number, and e-mail address.
    b. Name of manufacturer's service representative witnessing test, company name, phone number, and e-mail address.
    c. Detailed description of extent of tubing tested.
    d. Date and time at start of test.
    e. Test pressure at start of test.
    f. Outdoor temperature at start of test.
    g. Name of person ending test, company name, phone number, and e-mail address.
    h. Date and time at end of test.
    i. Test pressure at end of test.

j. Outdoor temperature at end of test.
k. Remarks:

5. Submit test reports for Project record.
6. Upon successful completion of evacuation testing, system is to be charged with refrigerant.

C. System Refrigerant Charge:

1. Using information collected from the refrigerant tubing evacuation testing, system Installer is to consult variable refrigerant system manufacturer to determine the correct system refrigerant charge.
2. Installer is to charge system following VRF HVAC system manufacturer's written instructions.
3. System refrigerant charging is to be witnessed by system manufacturer's representative.
4. Total refrigerant charge is to be recorded and permanently displayed at the system's outdoor unit.

D. Products will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.15 STARTUP SERVICE

A. Engage a VRF HVAC system manufacturer's service representative to perform system(s) startup service.

1. Service representative is to be a factory-trained and -authorized service representative of VRF HVAC system manufacturer.
2. Complete startup service of each separate system.
3. Complete system startup service in accordance with manufacturer's written instructions.

B. Startup checks are to include, but not be limited to, the following:

1. Check each indoor unit's response to demand for heating.
2. Check each indoor unit's response to changes in airflow settings.
3. Check each indoor unit and outdoor unit for proper condensate removal.
4. Check sound levels of each indoor and outdoor unit.

C. Installer is to accompany manufacturer's service representative during startup service and provide manufacturer's service representative with requested documentation and technical support during startup service.

1. Installer is to correct deficiencies found during startup service for reverification.

D. System Operation Report:

1. After completion of startup service, manufacturer is to issue a report for each separate system.

2. Report is to include complete documentation describing each startup check, the result, and any corrective action required.
3. Manufacturer is to electronically record not less than two hours of continuous operation of each system and submit with report for historical reference.

    a. All available system operating parameters are to be included in the information submitted.

3.16 ADJUSTING

A. Adjust equipment and components to function smoothly, and lubricate as recommended in writing by manufacturer.

B. Adjust initial temperature and humidity set points. Adjust initial airflow settings and discharge airflow patterns.

C. Set field-adjustable switches and circuit-breaker trip ranges in accordance with VRF HVAC system manufacturer's written instructions, and as indicated.

D. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.17 PROTECTION

A. Protect products from moisture and water damage. Remove and replace products that are wet, moisture damaged, or mold damaged.

B. Protect equipment from physical damage. Replace equipment with physical damage that cannot be repaired to new condition. Observable surface imperfections are grounds for removal and replacement.

C. Protect equipment from electrical damage. Replace equipment suffering electrical damage.

D. Cover and seal openings of equipment to keep inside of equipment clean. Do not remove covers until finish work is complete.

3.18 DEMONSTRATION

A. Engage a VRF HVAC system manufacturer's factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain entire system.

B. Instructor:

1. Instructor is to be factory trained and certified by VRF HVAC system manufacturer with current training on the system(s), equipment, and controls that are installed.

END OF SECTION

SECTION 23 82 39.19
WALL AND CEILING UNIT HEATERS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

1.2 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wall and ceiling unit heaters to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Berko; Marley Engineered Products.
2. INDEECO.
3. QMark; Marley Engineered Products.

2.2 DESCRIPTION

A. Assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 CABINET

A. Front Panel: Extruded-aluminum bar grille, with removable panels fastened with tamperproof fasteners.

B. Finish: Baked enamel over baked-on primer with manufacturer's standard color selected by Architect, applied to factory-assembled and -tested wall and ceiling heaters before shipping.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

D. Surface-Mounted Cabinet Enclosure: Steel with finish to match cabinet.

2.4 COIL

A. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in corrosion-resistant metallic sheath. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware, and limit controls for high-temperature protection. Provide integral circuit breaker for overcurrent protection.

2.5 FAN AND MOTOR

A. Fan: Aluminum propeller directly connected to motor.

B. Motor: Permanently lubricated , multispeed.

2.6 CONTROLS

A. Controls: Unit-mounted thermostat.

B. Electrical Connection: Factory wire motors and controls for a single field connection with disconnect switch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive wall and ceiling unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before unit-heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wall and ceiling unit heaters to comply with NFPA 90A.

B. Install wall and ceiling unit heaters level and plumb.

C. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION

SECTION 26 05 13
MEDIUM-VOLTAGE CABLES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of cable. Include splices and terminations for cables and cable accessories.

B. Samples: 16 inch lengths for each type of cable specified.

1.2 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type of cable and accessory.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with IEEE C2 and NFPA 70.

C. Source Limitations: Obtain cables and accessories from single source from single manufacturer.

D. Cables must comply with NYSEG and are subject to their approval.

E. Cables shall be 15 kV rated, shielded, 175 mils EPR insulation with full concentric neutral and overall insulating jacket with three equally spaced extruded red stripes. The minimum conductor size shall be #2 AWG aluminum. Cable shall be Okonite Okoguard URO-J, or a NYSEG approved equal.

2.2 SOURCE QUALITY CONTROL

A. Test and inspect cables according to the latest requirements of ICEA CS6-87 before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to NYSEG Publication SP-1099.

B. Install cables according to IEEE 576.

C. Proof conduits prior to conductor installation by passing a wire brush mandrel and then a rubber duct swab through the conduit. Separate the wire brush and the rubber swab by 48 to 72 inch on the pull rope.

D. Pull Conductors: Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

F. Install "buried-cable" warning tape 12 inch above cables.

G. In manholes, handholes, pull boxes, junction boxes, and cable vaults, train cables around walls by the longest route from entry to exit; support cables at intervals adequate to prevent sag.

H. Install sufficient cable length to remove cable ends under pulling grips. Remove length of conductor damaged during pulling.

I. Install cable splices at pull points and elsewhere as indicated; use standard kits. Use dead-front separable watertight connectors in manholes and other locations subject to water infiltration.

J. Install terminations at ends of conductors, and seal multiconductor cable ends with standard kits.

K. Install separable insulated-connector components as follows:

1. Protective Cap: At each terminal junction, with one on each terminal to which no feeder is indicated to be connected.
2. Portable Feed-Through Accessory: At each terminal junction, with one on each terminal.
3. Standoff Insulator: At each terminal junction, with one on each terminal.

L. Arc Proofing: Unless otherwise indicated, arc proof medium-voltage cable at locations not protected by conduit, cable tray, direct burial, or termination materials. In addition to arc-proofing tape manufacturer's written instructions, apply arc proofing as follows:

1. Clean cable sheath.
2. Wrap metallic cable components with 10 mil pipe-wrapping tape.
3. Smooth surface contours with electrical insulation putty.
4. Apply arc-proofing tape in one half-lapped layer with coated side toward cable.
5. Band arc-proofing tape with two layers of 1 inch wide half-lapped, adhesive, glass-cloth tape at each end of the arc-proof tape.

M. Ground shields of shielded cable at terminations, splices, and separable insulated connectors. Ground metal bodies of terminators, splices, cable and separable insulated-connector fittings, and hardware.

N. Identify cables according to Section 26 05 53 "Identification for Electrical Systems." Identify phase and circuit number of each conductor at each splice, termination, pull point, and

junction box. Arrange identification so that it is unnecessary to move the cable or conductor to read the identification.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
2. After installing medium-voltage cables and before electrical circuitry has been energized, test for compliance with requirements.
3. Perform direct-current High Potential test of each new conductor according to NETA ATS, Ch. 7.3.3. Do not exceed cable manufacturer's recommended maximum test voltage.

B. Medium-voltage cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

D. Conductor Insulation:
1. Type USE-2 and Type SE: Comply with UL 854.
2. Type THHN and Type THWN-2: Comply with UL 83.
3. Type UF: Comply with UL 83 and UL 493.
4. Type XHHW-2: Comply with UL 44.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Circuits:

1. Single circuit.

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Ground Conductor: Bare or Insulated.

F. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

G. Armor: Steel, interlocked.

H. Jacket: PVC applied over armor.

2.3 ARMORED CABLE, TYPE AC

A. Description: A factory assembly of insulated current-carrying conductors with or without an equipment grounding conductor in an overall metallic sheath.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 4.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Circuits:

1. Single circuit.

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Ground Conductor: Bare or Insulated.

F. Conductor Insulation: Type THHN/THWN-2. Comply with UL 83.

G. Armor: Steel, interlocked.

2.4 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70,

by a qualified testing agency, and marked for intended location and use.

B. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

C. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Size, ampacity rating, material, type and class for application and service indicated.
2. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:

1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
2. Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors must be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits:

1. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
2. Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in raceway Type USE, single conductor in raceway Multiconductor cable, Type SE.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in raceway Armored cable, Type AC Metal-clad cable, Type MC .

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway Armored cable, Type AC Metal-clad cable, Type MC .

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in raceway Underground feeder cable, Type UF.

E. Feeders Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway Armored cable, Type AC Metal-clad cable, Type MC Mineral-insulated, metal-sheathed cable, Type MI.

F. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in

raceway Armored cable, Type AC Metal-clad cable, Type MC .

G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway Armored cable, and Type AC Metal-clad cable.

H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway Type XHHW-2, single conductors in raceway Underground branch-circuit cable, Type UF.

3.3 INSTALLATION, GENERAL

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inch of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.7 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements:

B. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

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

1.2 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
   1. Ground rods.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Insulated Conductors in High Moisture Environments: Tinned Copper wire or cable insulated for 600V unless otherwise required by applicable Code or authorities having jurisdiction.

C. Bare Copper Conductors:

   1. Solid Conductors: ASTM B3.
   2. Stranded Conductors: ASTM B8.
   3. Tinned Conductors: ASTM B33.

D. Lead Content: Less than 300 parts per million.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Mechanical-Type Bus-Bar Connectors: Cast silicon bronze, solderless compression -type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Compression-Type Bus-Bar Connectors: Copper or copper alloy, with two wire terminals.

E. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

G. Conduit Hubs: Mechanical type, terminal with threaded hub.

H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

I. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

J. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.

K. Straps: Solid copper, cast-bronze clamp copper lugs. Rated for 600 A.

L. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

M. Water Pipe Clamps:

1. Mechanical type, two pieces with zinc-plated bolts.

   a. Material: Die-cast zinc alloy.
   b. Listed for direct burial.

2. U-bolt type with malleable-iron clamp and copper ground connector rated for direct burial.

N. Lead Content: Less than 300 parts per million.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 ft.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG Insert wire size minimum.

1. Bury at least 30 inch below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inch above duct bank when indicated as part of duct-bank installation.

C. Grounding Conductors: Green-colored insulation with continuous yellow stripe.

D. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inch below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. Use exothermic welds for all below-grade connections.
3. For grounding electrode system, install at least two rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal , and at individual ground rods. Make tests at ground rods before any conductors are connected.

   a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
5. Substations and Pad-Mounted Equipment: 5 ohms.
6. Manhole Grounds: 10 ohms.

E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Director's Representative promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SUPPORT SYSTEMS

A. Conduit and Cable Support Devices:

1. Standard Features: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

B. Support for Conductors in Vertical Conduit:

1. Standard Features: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.

C. Structural Steel for Fabricated Supports and Restraints:

1. Standard Features: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

2.2 MOUNTING, ANCHORING, AND ATTACHMENT COMPONENTS

A. Concrete Inserts:

1. Standard Features: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.

B. Clamps for Attachment to Steel Structural Elements:

1. Standard Features: MSS SP-58 units are suitable for attached structural element.

C. Through Bolts:

1. Standard Features: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.

D. Toggle Bolts:

1. Standard Features: All steel springhead type.

E. Hanger Rods:

1. Standard Features: Threaded steel.

PART 3 - EXECUTION

3.1 SELECTION OF HANGERS AND SUPPORTS

A. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as required by NFPA 70. Minimum rod size must be 1/4 inch in diameter.

B. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in the Contract Documents or manufacturer's published instructions, comply with the following:

1. Electrical Construction: ICC IBC, ICC IFC, NFPA 1, NFPA 70, and NECA NEIS 1.
2. Installation of Steel Conduit: NECA NEIS 101.
3. Consult Director’s Representative for resolution of conflicting requirements.

END OF SECTION

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For the following:

1. Wireways and auxiliary gutters.
2. Surface metal raceways.
3. Surface nonmetallic raceways.
4. Cabinets, cutout boxes, and miscellaneous enclosures.

PART 2 - PRODUCTS

2.1 TYPE EMT-S RACEWAYS AND ELBOWS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 797 and UL Category Control Number FJMX.

B. Steel Electrical Metal Tubing (EMT-S) and Elbows:

1. Material: Steel.
2. Options:

a. Exterior Coating: Zinc or Alternate corrosion-resistant coating.
b. Exterior Coating for Sensitive Electronic Equipment Areas: painted enamel finish or PVC coated finish.
c. Interior Coating: Zinc free Organic coating.
d. Minimum Trade Size: 1/2".
e. Colors: As indicated on Drawings.

2.2 TYPE ERMC-S RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 6 and UL Category Control Number DYIX.

B. Galvanized-Steel Electrical Rigid Metal Conduit (ERMC-S-G), Elbows, Couplings, and Nipples:

1. Exterior Coating: Hot Dipped Galvanized.

2. Options:

    a. Interior Coating: Hot Dipped Galvanized with organic top coating.
    b. Minimum Trade Size: 3/4" Metric designator 16 (trade size 1/2) Metric designator 21 (trade size 3/4).
    c. Colors: As indicated on Drawings.

2.3 TYPE FMC-S RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1 and UL Category Control Number DXUZ.

B. Steel Flexible Metal Conduit (FMC-S):

1. Material: Steel.
2. Options:

    a. Minimum Trade Size: 1/2" .
    b. Colors: As indicated on Drawings.

2.4 TYPE LFMC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 360 and UL Category Control Number DXHR.

B. Steel Liquid tight Flexible Metal Conduit (LFMC-S):

1. Material: Steel.
2. Options:

    a. Minimum Trade Size: 1/2".
    b. Colors: As indicated on Drawings.

2.5 TYPE PVC RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 651 and UL Category Control Number DZYR.

B. Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings:

1. Dimensional Specifications: Schedule 40.
2. Options:

    a. Minimum Trade Size: 1/2".
    b. Markings: For use with maximum 90 deg C wire.

C. Schedule 80 Rigid PVC Conduit (PVC-80) and Fittings:

1. Dimensional Specifications: Schedule 80.
2. Options:

    a. Minimum Trade Size: 1/2".
    b. Markings: For use with maximum 90 deg C wire.

2.6 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

B. Fittings for Type ERMC, Type IMC, and Type PVC Raceways:

1. General Characteristics: UL 514B and UL Category Control Number DWTT.
2. Options:

    a. Material: Steel.
    b. Coupling Method: Compression coupling.
    c. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
    d. Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

C. Fittings for Type EMT Raceways:

1. General Characteristics: UL 514B and UL Category Control Number FKAV.
2. Options:

    a. Material: Steel.
    b. Coupling Method: Setscrew coupling. Setscrew couplings with only single screw per conduit are unacceptable.
    c. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
    d. Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

D. Fittings for Type FMC Raceways:

1. General Characteristics: UL 514B and UL Category Control Number ILNR.

E. Fittings for Type LFMC and Type LFNC Raceways:

1. General Characteristics: UL 514B and UL Category Control Number DXAS.

2.7 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT COMPOUNDS FOR THREADED CONDUIT

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 2419 and UL Category Control Number FOIZ.

2.8 SOLVENT CEMENTS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: As recommended by conduit manufacturer in accordance with UL 514B and UL Category Control Number DWTT.
3. Sustainability Characteristics:
4. VOC Content: 510 g/L or less for PVC and 490g/L or less for CPVC conduit and fittings.

2.9 SURFACE METAL RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 5 and UL Category Control Number RJBT.

B. Surface Metal Raceways and Fittings with Metal Covers:

1. Options:

a. Galvanized steel base with snap-on covers.
b. Manufacturer's standard enamel finish in color selected by Architect.
c. Wiring Channels: . Multiple channels must be capable of housing a standard 20 to 30 A NEMA device flush within the raceway.

C. Surface Metal Raceways and Fittings with Nonmetallic Covers:

1. Additional Characteristics: UL 94, V-0 requirements for self-extinguishing characteristics.
2. Options:

a. Galvanized steel base with snap-on covers.
b. Provide texture and color selected by Architect from manufacturer's standard colors.

c. Wiring Channels: Multiple channels must be capable of housing a standard 20 to 30 A NEMA device flush within the raceway.

2.10 SURFACE NONMETALLIC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

a. UL 5A and UL Category Control Number RJTX.
b. UL 94, V-0 requirements for self-extinguishing characteristics.

B. Surface Nonmetallic Raceways and Fittings with Nonmetallic Covers:

1. Options:

a. Provide texture and color selected by Architect from manufacturer's standard colors.
b. Wiring Channels: Multiple channels must be capable of housing a standard 20 to 30 A NEMA device flush within the raceway.

2.11 WIREWAYS AND AUXILIARY GUTTERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 870 and UL Category Control Number ZOYX.

B. Metal Wireways and Auxiliary Gutters:

1. Additional Characteristics:

a. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
b. Finish: Manufacturer's standard enamel finish.

2. Options:

a. Degree of Protection: Type 12 unless otherwise indicated.
b. Wireway Covers: Hinged type or Screw-cover type unless otherwise indicated.

2.12 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 514A and UL Category Control Number QCIT.

B. Metallic Outlet Boxes:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
2. Options:

   a. Material: Sheet steel or Cast metal.
   b. Sheet Metal Depth: Minimum 1.5 inch.
   c. Cast-Metal Depth: Minimum 1.8 inch.
   d. Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing up to 50 lb. If more than 50lb, provide box marked with maximum allowable weight.
   e. Paddle Fan Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb.

C. Metallic Conduit Bodies:

1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.

D. Metallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.
2. Options:

   a. Material: Sheet steel or Cast metal.
   b. Sheet Metal Depth: minimum 1.5 inch.
   c. Cast-Metal Depth: minimum 1.8 inch.

E. Metallic Extension Rings:

1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.

2.13 NONMETALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 514C and UL Category Control Number QCMZ.

B. Nonmetallic Outlet Boxes:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.

C. Nonmetallic Conduit Bodies:

1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.

D. Nonmetallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.

E. Nonmetallic Extension Rings:

1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.

2.14 CABINETS, CUTOUT BOXES, JUNCTION BOXES, PULL BOXES, AND MISCELLANEOUS ENCLOSURES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

   a. Non-Environmental Characteristics: UL 50.
   b. Environmental Characteristics: UL 50E.

B. Indoor Sheet Metal Cabinets:

1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Additional Characteristics: UL Category Control Number CYIV.
3. Options:

   a. Degree of Protection: Type 12.

C. Indoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Additional Characteristics: UL Category Control Number BGUZ.
3. Options:

    a. Degree of Protection: Type 12.

D. Indoor Cast-Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Additional Characteristics: UL Category Control Number BGUZ.
3. Options:

    a. Degree of Protection: Type 12.

E. Outdoor Sheet Metal Cabinets:

1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Additional Characteristics: UL Category Control Number CYIV.
3. Options:

    a. Degree of Protection: Type 4X.

F. Outdoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Additional Characteristics: UL Category Control Number BGUZ.
3. Options:

    a. Degree of Protection: Type 4X.

G. Outdoor Cast-Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Additional Characteristics: UL Category Control Number BGUZ.
3. Options:

    a. Degree of Protection: Type 4X.

2.15 COVER PLATES FOR DEVICES BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked

for intended location and use.

2. General Characteristics:

a. Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
b. Wallplate-Securing Screws: Metal with head color to match wallplate finish.

B. Metallic Cover Plates for Device Boxes:

1. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: Steel with white baked enamel, suitable for field painting except in mechanical/electrical/equipment spaces provide Galvanized steel. In Damp/Wet locations provide non-magnetic stainless steel with brushed finish, .032 inch thick type 302/304.

C. Nonmetallic Cover Plates for Device Boxes:

1. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: 0.060 inch thick high-impact thermoplastic (nylon) with smooth finish and color matching wiring device.
c. Color: Ivory.

2.16 HOODS FOR OUTLET BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

a. Reference Standards:

1) UL 514D and UL Category Control Numbers QCIT and QCMZ.
2) Receptacle, hood, cover plate, gaskets, and seals comply with UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.

b. Mounts to box using fasteners different from wiring device.

B. Retractable or Reattachable Hoods for Outlet Boxes:

1. Options:

a. Provides clear, weatherproof, "while-in-use" cover.

C. Extra-Duty, While-in-Use Hoods for Outlet Boxes:

1. Additional Characteristics: Marked "Extra-Duty" in accordance with UL 514D.
2. Options:

a. Provides clear, weatherproof, "while-in-use" cover.
b. Manufacturer may combine nonmetallic device box with hood as extra-duty rated assembly.

PART 3 - EXECUTION

3.1 SELECTION OF RACEWAYS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of raceways. Consult Architect for resolution of conflicting requirements.

B. Outdoors:

1. Exposed and Subject to Physical Damage: ERMC.

a. Locations less than 2.5 m (8 ft) above finished floor.

2. Exposed and Not Subject to Physical Damage: ERMC PVC-80.
3. Concealed Aboveground: ERMC.
4. Direct Buried: PVC-80 PVC-40.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

C. Indoors:

1. Hazardous Classified Locations: ERMC or IMC.
2. Exposed and Subject to Physical Damage: ERMC. Subject to physical damage includes the following locations:

a. Locations less than 2.5 m (8 ft) above finished floor.
b. Stub-ups to above suspended ceilings.

3. Exposed and Not Subject to Physical Damage: EMT.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Damp or Wet Locations: ERMC.
6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
7. Circuits Operating Above 60 Hz: ERMC-A. Provide nonmetallic sleeve where aluminum

raceways pass through concrete.

D. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC and IMC: Provide threaded type fittings unless otherwise indicated.

3.2 SELECTION OF BOXES AND ENCLOSURES

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

a. Type 4 unless otherwise indicated.
b. Locations Exposed to Hosedown: Type 4.
c. Locations Subject to Potential Flooding: Type 6P.
d. Locations Aboveground Where Mechanism Must Operate When Ice Covered: Type 3S.
e. Locations in-Ground or Exposed to Corrosive Agents: Type 4X .
f. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.

2. Indoors:

a. Type 1 unless otherwise indicated.
b. Damp or Dusty Locations: Type 4.
c. Surface Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
d. Flush Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12K.

C. Exposed Boxes Installed Less Than 2.5 m (8 ft) Above Floor:

1. Provide cast-metal boxes.
2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

3.3 INSTALLATION OF RACEWAYS

A. Installation Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for installation of raceways. Consult Architect for resolution of conflicting requirements.

2. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
3. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
4. Comply with NECA NEIS 101 for installation of steel raceways.
5. Comply with NECA NEIS 102 for installation of aluminum raceways.
6. Comply with NECA NEIS 111 for installation of nonmetallic raceways.
7. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.
8. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to metric designator 35 (trade size 1-1/4) and insulated throat metal bushings on metric designator 41 (trade size 1-1/2) and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
9. Raceway Terminations at Locations Subject to Moisture or Vibration:

    a. Provide insulating bushings to protect conductors, including conductors smaller than No. 4 AWG. Install insulated throat metal grounding bushings on service conduits.

B. General Requirements for Installation of Raceways:

1. Complete raceway installation before starting conductor installation.
2. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft above finished floor.
3. Install no more than equivalent of three 90-degree bends in conduit run except for control wiring conduits, for which no more than equivalent of two 90-degree fewer bends are permitted. Support within 12 inch of changes in direction.
4. Make bends in raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
5. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
6. Support conduit within 12 inch of enclosures to which attached.
7. Install raceway sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings in accordance with NFPA 70.
8. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of raceways at the following points:

    a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
    b. Where an underground service raceway enters a building or structure.
    c. Conduit extending from interior to exterior of building.

d. Conduit extending into pressurized duct and equipment.
e. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
f. Where otherwise required by NFPA 70.

9. Do not install conduits within 2 inch of the bottom side of a metal deck roof.
10. Keep raceways at least 6 inch away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
11. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
12. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

C. Requirements for Installation of Specific Raceway Types:

1. Types ERMC and IMC:

a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

2. Type ERMC-S-PVC:

a. Follow manufacturer's installation instructions for clamping, cutting, threading, bending, and assembly.
b. Provide PVC-coated sealing locknut for exposed male threads transitioning into female NPT threads that do not have sealing sleeves, including transitions from PVC couplings/female adapters to Type ERMC-S-PVC elbows in direct-burial applications. PVC-coated sealing locknuts must not be used in place of conduit hub. PVC-coated sealing locknut must cover exposed threads on Type ERMC-S-PVC raceway.
c. Coat field-cut threads on PVC-coated raceway with manufacturer-approved corrosion-preventing conductive compound prior to assembly.

3. Types FMC, LFMC, and LFNC:

a. Comply with NEMA RV 3. Provide a maximum of 72 inch of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

4. Types PVC and EPEC:

a. Do not install Type PVC or Type EPEC conduit where ambient temperature exceeds 122 deg F . Conductor ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C

conductors are permitted.

b. Comply with manufacturer's written instructions for solvent welding and fittings.

D. Raceways Embedded in Slabs:

1. Run raceways larger than metric designator 27 (trade size 1) below concrete slab.
2. Arrange raceways to cross building expansion joints with expansion fittings at right angles to the joint.
3. Arrange raceways to ensure that each is surrounded by a minimum of 2 inch of concrete without voids.
4. Do not embed threadless fittings in concrete unless locations have been specifically approved by Architect.

E. Raceway Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
2. EMT: Provide setscrew, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.

F. Expansion-Joint Fittings:

1. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg F and that have straight-run length that exceeds 25 ft. Install in runs of aboveground ERMC and EMT conduit that are located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft.
2. Install type and quantity of fittings that accommodate temperature change listed for the following locations:

   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
   d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at locations where conduits cross building or structure expansion joints.
5. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location

at time of installation. Install conduit supports to allow for expansion movement.

3.4 INSTALLATION OF SURFACE RACEWAYS

A. Install surface raceways only where indicated on Drawings.

B. Install surface raceway with a minimum 2 inch radius control at bend points.

C. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inch and with no less than two supports per straight raceway section. Support surface raceway in accordance with manufacturer's written instructions. Tape and glue are unacceptable support methods.

3.5 INSTALLATION OF BOXES AND ENCLOSURES

A. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.

B. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

C. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.

D. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

E. Locate boxes so that cover or plate will not span different building finishes.

F. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.

G. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.

H. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.

I. Set metal floor boxes level and flush with finished floor surface.

J. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.

K. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

3.7 CLEANING

A. Boxes: Remove construction dust and debris from device boxes and outlet boxes before installing wallplates, covers, and hoods.

END OF SECTION

SECTION 26 05 43
UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Duct: A single raceway or multiple raceways, installed singly or as components of a duct bank.

B. Duct Bank: Two or more ducts installed in parallel, direct buried or with additional casing materials such as concrete.

C. Handhole: An underground chamber containing electrical cables, sized such that personnel are not required to enter in order to access the cables.

D. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For concrete and steel used in precast concrete manholes and handholes, also include product certificates as required by ASTM C858.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

B. Field Reports:

1. Factory Test Reports: For handholes and boxes.
2. Manufacturer's field reports for field quality-control support.

PART 2 - PRODUCTS

2.1 TYPE ERMC-SS RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 6A and UL CCN DYWV.

2.2 TYPE ERMC-S RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 6 and UL CCN DYIX.

2.3 TYPE PVC RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 651 and UL CCN DZYR.

2.4 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2.5 SOLVENT CEMENTS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: As recommended by conduit manufacturer in accordance with UL 514B and UL CCN DWTT.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

   a. ASTM C858 for design and manufacturing processes.
   b. SCTE 77.

2.7 SOURCE QUALITY CONTROL

A. Factory Tests for Handholes and Boxes:
1. Factory Tests and Inspections: Perform the following tests and inspections on handholes and boxes, by, or under supervision of, qualified electrical testing laboratory recognized

by authorities having jurisdiction, before delivering to site. Affix label with name and date of manufacturer's certification of system compliance.

a. Polymer Concrete and Nonconcrete Handhole and Pull-Box Prototypes: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests must be for specified tier ratings of products supplied. Testing machine pressure gages must have current calibration certification, complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

2. Nonconforming Work:

a. Equipment that does not pass tests and inspections will be considered defective.

3. Factory Test Reports: Prepare and submit factory test and inspection reports.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate layout and installation of duct, duct bank, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in field. Notify Architect if there is conflict between areas of excavation and existing structures or archaeological sites to remain.

B. Coordinate elevations of duct and duct-bank entrances into handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by Architect.

C. Clear and grub vegetation to be removed, and protect vegetation to remain in accordance with Section 311000 "Site Clearing." Remove and stockpile topsoil for reapplication in accordance with Section 311000 "Site Clearing."

3.2 SELECTION OF UNDERGROUND DUCTS

A. Duct for Electrical Cables More Than 600 V: PVC-40.

B. Duct for Electrical Feeders 600 V and Less: PVC-40.

C. Duct for Electrical Branch Circuits: PVC-40.

D. Underground Ducts Crossing Paved Paths Walks and Driveways: Rigid galvanized steel.

E. Underground Ducts Crossing Roadways and Railroads: rigid galvanized steel.

F. Stub-ups: PVC-80.

3.3 SELECTION OF UNDERGROUND ENCLOSURES

A. Handholes and Boxes:
   1. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15.
   2. Units in Sidewalk and Similar Applications with Safety Factor for Nondeliberate Loading by Vehicles: Polymer concrete units, SCTE 77, Tier 8.
   3. Units Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested in accordance with SCTE 77 with 3000 lbf vertical loading.
   4. Cover design load must not exceed load rating of handhole or box.

3.4 EARTHWORK

A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restoration: Restore area immediately after backfilling is completed.

C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 329200 "Turf and Grasses" and Section 329300 "Plants."

E. Cut and patch existing pavement in path of underground duct, duct bank, and underground structures.

3.5 INSTALLATION OF DUCTS AND DUCT BANKS

A. Reference Standards:

   1. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NEMA TCB 2 for installation of underground ducts and duct banks.
   2. Consult Architect for resolution of conflicting requirements.

B. Special Techniques:

   1. Steel raceway, bends, and fittings in on Project must be of same type.
   2. Slope: Pitch duct minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from high point between two manholes to drain in both directions.
   3. Expansion and Deflection Fittings: Install expansion and deflection fitting in each duct in area of disturbed earth adjacent to manhole or handhole.
   4. Install expansion fitting near center of straight line duct with calculated expansion of more than 3/4 inch.

5. Curves and Bends:

    a. Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with minimum radius of 48 inch, both horizontally and vertically, at other locations unless otherwise indicated.
    b. Field bending must be in accordance with NFPA 70 minimum radii requirements, except bends over 45 degrees must be made with minimum radius of 48 inch. Use only equipment specifically designed for material and size involved. Use PVC heating bender for bending PVC conduit.
    c. Duct must have maximum of 180 degrees of bends between pull points.

6. Joints: Use solvent-cemented joints in nonmetallic duct and fittings and make watertight in accordance with manufacturer's published instructions. Stagger couplings so those of adjacent duct do not lie in same plane. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with minimum 3 inch of concrete for minimum of 12 inch on each side of coupling.

    a. Install insulated grounding bushings on steel raceway terminations that are less than 12 inch below grade or floor level and do not terminate in hubs.

7. Duct Terminators for Entrances to Cast-in-Place Manholes and Concrete Handholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately 6 inch o.c. for 4 inch duct, and vary proportionately for other duct sizes.

    a. Begin change from regular spacing to terminator spacing 10 ft from terminator, without reducing duct line slope and without forming trap in line.

8. Building Wall Penetrations: Make transition from underground duct to steel raceway at least 10 ft outside building wall, without reducing duct line slope away from building and without forming trap in line. Use fittings manufactured for transition to steel raceway type installed. Install steel raceway penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
9. Install manufactured steel raceway elbows for stub-ups at poles unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

    a. Couple steel elbows to ducts with adapters designed for this purpose, and encase coupling with minimum 3 inch of concrete for minimum of 12 inch on each side of coupling.

10. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15 psig hydrostatic pressure.
11. Pulling Cord: Install 200 lbf test nylon cord in empty ducts.
12. Direct-Buried Duct and Duct Bank:

    a. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 31 20 00 "Earth Moving" for preparation of trench

bottoms for pipes less than 6 inch in nominal diameter.

b. Width: Excavate trench 3 inch wider than duct on each side.
c. Depth: Install top of duct at least 36 inch below finished grade unless otherwise indicated.
d. Set elevation of top of duct bank below frost line.
e. Place minimum 3 inch of sand as bed for duct. Place sand to minimum of 6 inch above top level of duct.
f. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
g. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per 20 ft of duct. Place spacers within 24 inch of duct ends. Stagger spacers approximately 6 inch between tiers. Secure spacers to earth and to ducts to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
h. Install duct with minimum of 3 inch between ducts for like services and 6 inch between power and communications duct.
i. Install manufactured duct elbows for stub-ups, at building entrances, and at changes of direction in duct direction unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
j. Install manufactured steel elbows for stub-ups, at building entrances, and at changes of direction in duct.

    1) Couple RNC duct to steel raceway with adapters designed for this purpose, and encase coupling with minimum 3 inch of concrete.
    2) Stub-ups to Outdoor Equipment: Extend concrete-encased steel raceway horizontally minimum of 60 inch from edge of base. Install insulated grounding bushings on terminations at equipment.

        a) Stub-ups must be minimum 4 inch above finished base and minimum 3 inch from conduit side to edge of base.

    3) Stub-ups to Indoor Equipment: Extend concrete-encased steel raceway horizontally on exterior of wall minimum of 60 inch from edge of wall. Install insulated grounding bushings on terminations at equipment.
    4) Stub-ups through interior floors must be minimum 4 inch above finished floor and no less than 3 inch from conduit side to edge of equipment pad or floor slab.

13. Warning Planks: Bury warning planks approximately 12 inch above direct-buried duct, placing them 36 inch o.c. Align planks along width and along centerline of duct or duct bank. Provide additional plank for each 12 inch increment of duct-bank width over nominal 18 inch. Space additional planks 12 inch apart, horizontally across width of ducts.
14. Underground-Line Warning Tape: Bury conducting underground line specified in Section 260553 "Identification for Electrical Systems" no less than 12 inch above concrete-encased duct and duct banks and approximately 12 inch below grade. Align tape parallel

to and within 3 inch of centerline of duct bank. Provide additional warning tape for each 12 inch increment of duct-bank width over nominal 18 inch. Space additional tapes 12 inch apart, horizontally across width of ducts.

15. Ground ducts and duct banks in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

3.6 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Special Techniques:

1. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of duct, and seal joint between box and extension as recommended by manufacturer.
2. Unless otherwise indicated, support units on level bed of crushed stone or gravel, graded from 1/2 inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
3. Elevation: In paved areas and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch above finished grade.
4. Install handholes and boxes with bottom below frost line below grade.
5. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.
6. Field cut openings for duct in accordance with enclosure manufacturer's published instructions. Cut wall of enclosure with tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.
7. For enclosures installed in asphalt paving and subject to occasional, nondeliberate, heavy-vehicle loading, form and pour concrete ring encircling, and in contact with enclosure entry, and with top surface screeded to top of box cover frame. Bottom of ring must rest on compacted earth.

    a. Concrete: 3000 psi, 28-day strength, complying with Section 03 30 00 "Cast-in-Place Concrete," with troweled finish.
    b. Dimensions: 10 inch wide by 12 inch deep.

8. Ground handholes and boxes in accordance with Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.7 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of manholes, including sump, and building interiors affected by Work.

1. Sweep floor, removing dirt and debris.
2. Remove foreign material.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 LABELS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria: UL CCN PGDQ2 for components; including UL 969.

2.2 EXTRUDED INSULATING TUBING

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria: UL CCN YDPU2 for components; including UL 224.

2.3 TAPES AND STENCILS

A. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height must be 1 inch.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturers of identification product.

3.2 SELECTION OF COLORS AND IDENTIFICATION MARKINGS

A. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded service and branch-circuit conductors.

B. Color-Coding Instructional Signs: Self-adhesive labels, including color code for grounded and ungrounded conductors.

C. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:
   1. "POWER."

D. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

E. Locations of Underground Lines: Underground-line warning tape for power and lighting.

F. Vaults, Manholes, Handholes, and Pull and Junction Boxes, More Than 1000 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic preprinted tags colored and marked to indicate phase, and separate tag with circuit designation.

G. Accessible Raceways, Armored and Metal-Clad Cables, More Than 1000 V: Vinyl wraparound labels.

   1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
   2. Identify system voltage and system or service type with black letters on orange field.

H. Vaults, Manholes, Handholes, and Pull and Junction Boxes, 1000 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels to identify phase.

   1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
   2. Identify system voltage and system or service type with black letters on orange field.

I. Accessible Raceways and Metal-Clad Cables, 1000 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive vinyl tape applied in bands.

   1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
   2. Identify system voltage and system or service type with black letters on orange field.

J. Cover Plates: Label individual cover plates with self-adhesive labels. Place label at top of cover plate. Label cover plate with the following information, in the order listed:

   1. Panelboard designation.
   2. Colon or dash.

3. Branch circuit number.

K. Equipment Identification Labels:

1. Black letters on white field.
2. Indoor Equipment: Self-adhesive label.
3. Outdoor Equipment: Laminated acrylic or melamine sign.
4. Equipment to Be Labeled:
   a. Racks, Frames, and Enclosures: Identify front and rear of each with self-adhesive labels containing equipment designation.
   b. Panelboards: Typewritten directory of circuits in location provided by panelboard manufacturer. Panelboard identification must be in form of self-adhesive, engraved, laminated acrylic or melamine label.
   c. Enclosures and electrical cabinets.
   d. Access doors and panels for concealed electrical items.
   e. Enclosed switches.
   f. Enclosed circuit breakers.
   g. Enclosed controllers.
   h. Push-button stations.
   i. Power-transfer equipment.
   j. Contactors.
   k. Remote-controlled switches, dimmer modules, and control devices.

L. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

END OF SECTION

SECTION 26 08 00
ENHANCED TESTING/COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes Commissioning (Cx) process requirements for the following electrical components, systems, assemblies, and equipment:

1. Electrical equipment connected to power systems, including the following:

   a. Secondary service electrical systems.
   b. Distribution and branch-circuit panelboards.

2. Controls and instrumentation, including the following:

   a. Lighting control systems.

3. Systems testing and verification, including power systems.

1.2 DEFINITIONS

A. Enhanced Testing/Commissioning.

B. Low Voltage: 600 V and below.

C. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electrical systems and components to include in operation and maintenance manuals. In accordance with the 2025 Energy Conservation Construction Code of New York State, provide the following:

1. Manufacturers information
2. Specifications and recommendations;
3. Programming procedures and data points;
4. Narratives;
5. Other means of illustrating to the Director how the lighting is to be installed, maintained, and operated;
6. Required regular maintenance actions for equipment.

1.4 QUALITY ASSURANCE

A. Electrical Testing Technician Qualifications: Technicians to perform electrical Construction

Checklist verification tests, Construction Checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:

1. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL TESTING REQUIREMENTS

A. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating according to the Contract Documents and approved Shop Drawings and submittals.

B. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved Shop Drawings and submittals, and that pretest set points have been recorded.

C. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions to verify compliance with acceptance criteria.

D. Construction Checklists: Prepare and submit detailed construction checklists for electrical systems, subsystems, equipment, and components.

1. Testing includes the following:

a. Lighting controls for each space, in accordance with electrical drawings.

E. Perform tests using design conditions, whenever possible.

1. Simulated conditions may, with approval of Director’s Representative, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads.

END OF SECTION

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

PART 2 - PRODUCTS

2.1 ELECTRONIC TIME SWITCHES

A. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Contact Configuration: DPDT.
3. Contact Rating: 30 A inductive or resistive, 240 V(ac).
4. Programs:

   a. Eight on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
   b. Two channels; each channel is individually programmable with eight on-off set points on a 24-hour schedule.

5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
6. Astronomic Time: All channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

2.2 INDOOR OCCUPANCY AND VACANCY SENSORS

A. General Requirements for Sensors:

1. Wall or Ceiling-mounted, solid-state indoor occupancy and vacancy sensors.
2. Passive infrared or Ultrasonic or Dual technology.
3. Integrated or Separate power pack.
4. Hardwire Wireless connection to switch.
5. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing

laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

6. Operation:

    a. Occupancy Sensor: Unless otherwise indicated, turn lights on to 50% when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
    b. Vacancy Sensor: Unless otherwise indicated, lights are manually turned on and sensor turns lights off when the room is unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

7. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A Sensor is powered from the power pack .
8. Power: Line voltage to power pack and 24V to sensor.
9. Power Pack: Dry contacts rated for 20 A LED load at 120 and 277 V(ac), for 13 A tungsten at 120 V(ac), and for 1 hp at 120 V(ac). Sensor has 24 V(dc), 150 mA, Class 2 power source.
10. Mounting:

    a. Sensor: Suitable for mounting in any position in a standard device box or outlet box.
    b. Relay: Externally mounted through a 1/2 inch knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
12. Bypass Switch: Override the "on" function in case of sensor failure.

B. PIR Type: Wall Ceiling mounted; detect occupants in coverage area by their heat and movement.

1. Detector Sensitivity: Detect occurrences of 6 inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. inch.
2. Detection Coverage (Room, Ceiling Mounted): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96 inch high ceiling.
3. Detection Coverage (Corridor, Ceiling Mounted): Detect occupancy within 90 ft. when mounted on a 10 ft. high ceiling.
4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 1000 sq. ft.2000 sq. ft. 3000 sq. ft. when mounted 48 inch above finished floor.

C. Ultrasonic Type: Wall mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.

1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inch in either a horizontal or a vertical manner at an approximate speed of 12 inch/s.

2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. when mounted on a 96 inch high ceiling.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96 inch high ceiling.
4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 1000 sq. ft. when mounted 84 inch above finished floor.

D. Dual-Technology Type: Wall Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6 inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. inch, and detect a person of average size and weight moving not less than 12 inch in either a horizontal or a vertical manner at an approximate speed of 12 inch/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96 inch high ceiling.
4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of up to2000 sq. ft. when mounted 84 inches above finished floor.

2.3 LIGHTING CONTACTORS

A. Description: Electrically operated and mechanically held, combination-type lighting contactors with nonfused disconnect, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less THD of normal load current).
2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices as , matching the NEMA type specified for the enclosure.

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than

No. 14 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF SENSORS

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's instructions.

3.3 INSTALLATION OF CONTACTORS

A. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.4 INSTALLATION OF WIRING

A. Wiring Method: Comply with Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

B. Wiring within Enclosures: Separate power-limited and nonpower-limited conductors in accordance with conductor manufacturer's instructions.

C. Size conductors in accordance with lighting control device manufacturer's instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, device, and outlet boxes; terminal cabinets; and equipment enclosures.

3.5 IDENTIFICATION

A. Identify components and power and control wiring in accordance with Section 26 05 53 "Identification for Electrical Systems.

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.6 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Nonconforming Work:

1. Lighting control devices will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Director’s operations.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. HID: High-intensity discharge.

E. MCCB: Molded-case circuit breaker.

F. SPD: Surge protective device.

G. VPR: Voltage protection rating.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1.3 INFORMATIONAL SUBMITTALS

A. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.5 FIELD CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

    a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
    b. Altitude: Not exceeding 6600 feet.

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Construction Manager's written permission.
3. Comply with NFPA 70E.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.

1. SPD Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by

a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

E. Enclosures: Flush and Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

    a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
    b. Outdoor Locations: NEMA 250, Type 3R.
    c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
    d. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5 Type 12.

2. Height: 84 inches maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
6. Finishes:

    a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    b. Back Boxes: Galvanized steel.

F. Incoming Mains:

1. Location: Bottom.
2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

G. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated aluminum up to 400A, Hard-drawn copper, 98 percent conductivity for 600A and above.

    a. Plating shall run entire length of bus.
    b. Bus shall be fully rated the entire length.

2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
5. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
6. Split Bus: Vertical buses divided into individual vertical sections.

H. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated aluminum.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Compression or Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Compression or Mechanical type, with a lug on the bar for each pole in the panelboard.
6. Gutter-Tap Lugs: Compression or Mechanical type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device.

I. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

J. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices. See drawings for quantities of spares and spaces.

K. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1for mounting on line side, ahead of the service disconnect and Type 2 for mounting on the load side of the service disconnect.

2.3 POWER PANELBOARDS

A. Panelboards: NEMA PB 1, distribution type.

B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

C. Mains: Circuit breaker or Fused switch or Lugs only, see drawings.

D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

B. Mains: Circuit breaker or lugs only, see drawings.

C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

E. Doors-1: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
4. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault

protection (6-mA trip).

5. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
6. Subfeed Circuit Breakers: Vertically mounted.
7. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Breaker handle indicates tripped status.
    c. UL listed for reverse connection without restrictive line or load ratings.
    d. Lugs: Compression or Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    e. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    f. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
    g. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
    h. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
    i. Auxiliary Contacts: One, SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
    j. Multipole units enclosed in a single housing with a single handle.
    k. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
    l. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.6 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Typed or Computer Generated Directory card inside panelboard door, mounted in transparent card holder.

    1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Comply with NECA 1.

C. Install panelboards and accessories according to NECA 407.

D. Equipment Mounting:

1. Install panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 03 30 00 "Cast-in-Place Concrete."
2. Attach panelboard to the vertical finished or structural surface behind the panelboard.

E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

F. Mount top of trim at max 90 inches above finished floor and operating handle at max 79 inches above finished floor, unless otherwise indicated.

G. Mount panelboard cabinet plumb and rigid without distortion of box.

H. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

I. Mount surface-mounted panelboards to steel slotted supports 1 1/4 inch in depth. Orient steel slotted supports vertically.

J. Install overcurrent protective devices and controllers not already factory installed.

1. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

K. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

L. Install filler plates in unused spaces.

M. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 26 05 53 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

D. Install warning signs complying with requirements in Section 26 05 53 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Panelboards will be considered defective if they do not pass tests and inspections.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated on drawings.

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

1. Measure loads during period of normal facility operations.
2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Director's Representative. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 GENERAL-USE SWITCHES, DIMMER SWITCHES, AND FAN-SPEED CONTROLLER SWITCHES

A. Toggle Switch:

1. Regulatory Requirements:

   a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. General Characteristics:

   a. Reference Standards: UL CCN WMUZ and UL 20.

3. Options:

   a. Device Color: Ivory White.
   b. Configuration:
      1) General-duty, 120-277 V, 20 A, single pole.

4. Accessories:

   a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
   b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

2.2 GENERAL-GRADE DUPLEX STRAIGHT-BLADE RECEPTACLES

A. Duplex Straight-Blade Receptacle:

1. Regulatory Requirements:

   a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended

location and application.

2. General Characteristics:

a. Reference Standards: UL CCN RTRT and UL 498.

3. Options:

a. Device Color: White.
b. Configuration:
1) Heavy-duty, NEMA 5-20R.

4. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

B. Tamper-Resistant Duplex Straight-Blade Receptacle:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. General Characteristics:

a. Reference Standards: UL CCN RTRT and UL 498.

3. Options:

a. Device Color: White.
b. Configuration:
1) Heavy-duty, NEMA 5-20R.

4. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

C. Tamper-Resistant Duplex Straight-Blade Receptacle with USB Outlet to Power Class 2 Equipment:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. General Characteristics:

a. Reference Standards: UL CCN RTRT and UL 498.

3. Options:

a. Device Color: White.
b. Configuration:

1) General-duty, NEMA 5-20R; two USB-A ports.

4. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

2.3 RECEPTACLES WITH ARC-FAULT AND GROUND-FAULT PROTECTIVE DEVICES

A. General-Grade, Tamper-Resistant Duplex Straight-Blade Receptacle with AFCI Device:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. General Characteristics:

a. Reference Standards: UL CCN AWBZ, UL 498, UL 1699, and UL Subject 1699A.

3. Options:

a. Device Color: White.
b. Configuration: Heavy-duty, NEMA 5-20R.

4. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

B. General-Grade, Tamper-Resistant Duplex Straight-Blade Receptacle with AFCI and GFCI Device:

1. Regulatory Requirements:

    a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. General Characteristics:

    a. Reference Standards: UL CCN KCXX, UL 498, UL 943, UL 1699, and UL Subject 1699A.

3. Options:

    a. Device Color: White.
    b. Configuration: Heavy-duty, NEMA 5-20R.

4. Accessories:

    a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
    b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

C. General-Grade, Weather-Resistant, Tamper-Resistant Duplex Straight-Blade Receptacle with GFCI Device:

1. Regulatory Requirements:

    a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. General Characteristics:

    a. Reference Standards: UL CCN KCXS, UL 498, and UL 943.

3. Options:

    a. Device Color: Ivory White.
    b. Configuration: Heavy-duty, NEMA 5-20R.

4. Accessories:

    a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
    b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receptacles:

1. Verify that receptacles to be procured and installed for Owner-furnished equipment are compatible with mating attachment plugs on equipment.

3.2 INSTALLATION OF SWITCHES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Consult Architect for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number.

   a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black -filled lettering, and provide durable wire markers or tags inside device box or outlet box.

D. Accessories and Related Equipment.

1. Lighting: Provide all sensors, connection hubs, and wiring as needed for a complete operating system.

3.3 INSTALLATION OF STRAIGHT-BLADE RECEPTACLES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
4. Consult Architect for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 26 05 53 "Identification for Electrical Systems."

    a. Healthcare Facilities: Distinctively identify covers or cover plates of device boxes and outlet boxes that are supplied from life safety and critical branch power supplies following facility's standard practice.

D. Interfaces with Other Work:

1. Do not install Type 3 SPD, including surge-protected relocatable taps and power strips, on branch circuit downstream of GFCI device.

3.4 PROTECTION

A. Devices:

1. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.
2. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Director.

END OF SECTION

SECTION 26 50 00
LIGHTING

PART 1 - GENERAL

1.1 DEFINITIONS

A. BUG Rating: Backlight, uplight, and glare rating for light pollution from exterior luminaires.

B. Correlated Color Temperature (CCT): The absolute temperature (in kelvins) of a blackbody whose chromaticity (color quality) most nearly resembles that of the light source.

C. Color Rendering Index (CRI): The measure of the degree of color shift objects undergo when illuminated by the light source as compared with the color of those same objects when illuminated by a reference light source. The lower the CRI of a light source, the more difficult it is to identify colors and stripes on electronic components and wiring.

D. IDA: International Dark-Sky Association.

E. IES: Illuminating Engineering Society.

F. LPD: Lighting power density.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect exposed surface finishes on lighting equipment by applying strippable, temporary protective covering before shipping.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.2 LUMINAIRE FITTINGS

A. Luminaire Support Accessories:

1. Standard Features:

    a. Sized and rated for luminaire weight.
    b. Capable of maintaining luminaire position after cleaning and relamping.
    c. Capable of supporting luminaire without causing deflection of ceiling or wall.
    d. Capable of supporting horizontal force equal to 100 percent of luminaire weight and vertical force equal to 400 percent of luminaire weight.
2. Other Available Features Required by the Project:
    a. Hook Hangers: Integrated assembly matched to luminaire, supply voltage, and equipment with threaded attachment, cord, and locking-type plug.
    b. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gauge wire supports in length.
    c. Aircraft Cables: 5/32 inch diameter aircraft cable supports in length.
    d. Single-Stem Hangers: 1/2 inch nominal diameter steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
    e. Rod Hangers: 3/16 inch nominal diameter, cadmium-plated, threaded steel rod.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF LIGHTING

A. Comply with manufacturer's published instructions.

B. Special Installation Techniques:

1. Install luminaires level, plumb, and square with finished floor or grade unless otherwise indicated.
2. Install luminaires at height and aiming angle as indicated on the Drawings.
3. Coordinate layout and installation of luminaires with other construction.
4. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.
5. Exterior Bollard Luminaires:

    a. Align units for optimum directional alignment of light distribution.
    b. Install on concrete base with top 4 inch above finished grade or surface at luminaire location. Cast conduit into base, and shape base to match shape of

bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

6. Exterior Corrosion Prevention:

   a. Do not use aluminum in contact with earth or concrete. When in direct contact with dissimilar metals, protect aluminum with insulating fittings or treatment.
   b. When embedding steel conduits in concrete, wrap conduit with 10 mil thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

7. Flush-Mounted Luminaire Support:

   a. Secured to outlet box.
   b. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
   c. Trim ring flush with finished surface.

8. Wall-Mounted Luminaire Support: Attached to structural members in walls.

   a. Do not attach luminaires directly to gypsum board.

9. Suspended Luminaire Support:

   a. Pendants and Rods: Where longer than 48 inch, brace to limit swinging.
   b. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
   c. Continuous Rows of Luminaires: Provide tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
   d. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

10. Ceiling-Grid-Mounted Luminaire Support:

    a. Install ceiling support system rods or wires , independent of the ceiling suspension devices, for each luminaire. Locate not more than 6 inch from luminaire corners.
    b. Support Clips: Fasten to luminaires and to ceiling grid members at or near each luminaire corner with clips that are UL listed for application.
    c. Luminaires of Sizes Smaller than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support luminaires independently with no fewer than two 3/4 inch metal channels spanning and secured to ceiling tees.

11. Remote Mounting of Ballasts or Drivers: Do not exceed distance between ballast or

driver and luminaire recommended by ballast or driver manufacturer.

12. Install wiring connections for luminaires.
13. Identification: Provide labels for luminaires and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Provide warning signs.
    c. Label each enclosure with engraved metal or laminated-plastic nameplate.

C. Systems Integration: Integrate lighting control devices and equipment with electrical power connections for operation of luminaires as specified.

3.3 FIELD QUALITY CONTROL OF LIGHTING

A. Field tests and inspections must be witnessed by Director’s Representative.

B. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.
2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
3. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
4. Verify operation of photoelectric controls.
5. Exterior Illumination Tests:

    a. Measure light intensities at night. Use photometers with calibration referenced to NIST standards.

C. Nonconforming Work:

1. Luminaire will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

3.4 CLOSEOUT ACTIVITIES

A. Training:

1. Train Owner's maintenance personnel on the following topics:

    a. How to adjust, operate, and maintain luminaires and controls.

2. Allow Owner to record training sessions.

3.5 PROTECTION

A. After installation, protect lighting equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "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; 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 larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

D. Tree and Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to be stockpiled or otherwise remain Director’s property, cleared materials shall become Contractor's property and shall be removed from Project site. Do not allow cleared material to intermix with stockpiled topsoil.

1.3 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 video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.4 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 Director and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed trafficways if required by Director's Representative or authorities having jurisdiction.

B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on site where indicated or as directed by Director's Representative.

C. Utility Locator Service: Notify utility locator service UDig NY at (800) 962-7962 for area where Project is located before site clearing.

D. Site Inspection: Prior to all work of this section, carefully inspect the entire site, notify the Director's Representative of any discrepancies between the design of the Contract Drawings and actual physical site conditions.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

F. 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.

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

I. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 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

3.1 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. Wrap a 1-inch blue vinyl tape flag around 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 Director's Representative.

3.2 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 Contract Drawings and requirements of the project's Storm Water Pollution Prevention Plan (SWPPP).

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. Upon completion of construction activities and establishment of vegetation and/or pavements, remove erosion and sedimentation-control measures. Restore and stabilize areas disturbed during removal operations.

3.3 TREE AND PLANT PROTECTION

A. Provide tree protection fencing around existing trees to remain. Fencing shall be in accordance with the Contract Drawings.

3.4 EXISTING IMPROVEMENTS

B. Use all means necessary to protect existing improvements not designated for removal and, in the event of damage, immediately make all repairs and replacements necessary to the approval of the Director's Representative at no additional cost.

3.5 EXISTING UTILITIES

A. Preserve in operating condition all active utilities transversing the site and designated to remain. Indicated locations are approximate; determine exact locations before commencing work.

B. Arrange and pay for disconnecting and sealing indicated utilities that serve existing structures before site clearing. Notify affected utility companies in advance and obtain approval before starting work.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

C. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Place markers to indicate location of disconnected services. Identify service lines and capping locations on project record documents.
2. Arrange with utility companies to shut off indicated utilities.
3. Director's Representative will arrange and shut off indicated privately owned utilities when requested by the Contractor.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Director or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Director's Representative not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Director's Representative written permission.

E. Excavate for and remove underground utilities indicated to be removed.

3.6 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Removal, if required, is to be done in November and December. If removal is required to be done from January through March, or from September through October, the Director's Regional Biologist must be consulted prior to cutting. Tree cutting from April through August shall be avoided.
2. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
3. Clear and grub existing vegetation, regardless of size, necessary to install the work of this Contract. Remove all above ground portion of plants. Grub all below ground portion of plants to a minimum of 6" below finish grade in lawn areas. Completely remove all below ground portions of plants in areas to be covered with structures, pavements, and planting beds. All individual trees indicated for removal are to be removed in their entirety, including all stumps and major roots systems.
4. Grind down stumps and remove roots, obstructions, and debris to a depth of 12 inches below exposed subgrade.
5. Use only hand methods or air spade for grubbing within protection zones.

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.

C. The extent of all clearing and grubbing shall be approved by the Director's Representative before work begins.

3.7 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger 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 or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water or provide temporary seed and mulch.

1. Do not stockpile topsoil within protection zones.
2. Do not stockpile non-organic mineral soil or other contaminated materials with topsoil.
3. If surplus topsoil remains at the completion of the project, remove surplus topsoil and dispose of it off-site.

3.8 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

3.9 DUST CONTROL

A. Use all means necessary to prevent the spread of dust during performance of the work of this section; thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

3.10 BURNING

A. On-site burning will not be permitted.

3.11 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-site.

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other project work.

3.12 SALVAGE OF MATERIALS

A. Carefully remove items indicated to be salvaged and store them on NYSOPRHP premises at locations directed by Director's Representative.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.1 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Common Fill: Aggregate to be used below granular fill.

E. 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 Director's Representative. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Director's Representative. Unauthorized excavation, as well as remedial work directed by Director's Representative, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Leveling Bed: Aggregate layer beneath utility structures over subgrade.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 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.

2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.

I. Granular Fill: Aggregate to be used beneath building foundations and floor slabs, and adjacent to structures.

J. Select Granular Material: Aggregate to be used as utility trench and utility structure backfill below paved areas.

K. 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.

L. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

M. 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.

N. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct preexcavation conference at Project site.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

a. Personnel and equipment needed to make progress and avoid delays.
b. Coordination of Work with utility locator service.
c. Coordination of Work and equipment movement with the locations of tree- and plant protection zones.
d. Extent of trenching by hand or with air spade.
e. Field quality control.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.
3. Warning tapes.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D2487.
2. Laboratory compaction curve according to ASTM D1557.
3. Submit test data with supplier's name, location of source and sieve analysis of material showing conformance with the specifications.

C. Dewatering Plan

1. Include a written plan for dewatering operations including control procedures to be adopted in dewatering problems arise.

D. 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.

1.5 QUALITY ASSURANCE

A. Codes and Standards

1. Comply with the provisions of the following codes and standards except where more stringent requirements are shown or specified.
   a. Local Regulations
   b. New York State Department of Transportation (NYSDOT) Standard Specifications, current edition.
2. Excavations, trench depths and widths, sheeting, shoring, bracing, and cutback slopes to be determined by the Contractor shall comply with standard set by OSHA, NYS Department of Labor, NYS Industrial Code and all other applicable safety standards.

B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.6 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 Director's Representative and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Director's Representative or authorities having jurisdiction.

B. Utility Locator Service: Notify UDIG NY at (800) 962-7962 and local utility agencies for area where Project is located before beginning earth-moving operations.

C. Existing Utilities

1. Determine location of existing underground utilities in advance of excavation work.
2. Notify local utility companies 48 hours prior to excavation work.
3. Provide adequate means of support and protection during earthwork operations for utilities indicated to remain in place and functional.
4. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, notify utility company and Director's Representative immediately for directions.
5. Cooperate with Director's Representative and utility companies in keeping respective services and facilities in service.
6. Immediately repair damaged utilities to satisfaction of Director's Representative.
7. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.

D. Do not commence earth-moving operations until temporary erosion- and sedimentation-control measures, specified in the project's Stormwater Pollution Prevention Plan (SWPPP) report and the Contract Documents, are in place.

E. Do not commence earth-moving operations until tree and plant protection measures, specified in the Contract Documents, are in place.

F. 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.

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487, 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 GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, 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. Common Fill: Suitable material consisting of durable soil material, free of any organic matter. The plasticity index should be less than 15. Common fill should have 100 percent finer than 6 inches, at least 90 percent finer than 3 inches, and at least 20 percent finer than the Number 4 sieve.

E. Granular Fill: Suitable material conforming to NYSDOT Items 304.11, Type 1, Item 304.12, Type 2 or Item 304.14, Type 4.

F. Select Granular Material: Suitable material conforming to NYSDOT Item 203.07, Select Granular Fill.

G. Subbase Course: Suitable material conforming to NYSDOT Item 304.12, Type 2.

H. Pipe Bedding Material For All Utilities Except Storm Sewer: Suitable material conforming to NYSDOT Item 203.25, Sand Backfill.

I. Pipe bedding material for storm sewer shall meet the requirements of Granular Fill.

J. Backfill for utility pipes and structures (non-paved areas): Satisfactory soils consisting of on-site or borrow soil materials.

K. Backfill for utility pipes and structures in paved areas shall meet the requirements of Select Granular Material.

L. Leveling bed for utility structures: Shall meet the requirements of Granular Fill.

M. Crushed Stone: Suitable material conforming to NYSDOT Material Designation 703-02, Crushed Bedrock/Stone.

N. Drainage stone: Suitable material conforming to NYSDOT Material Designation 703-02, Crushed Bedrock/Stone – Size #1.

O. Rip Rap: Suitable material conforming to NYSDOT Item No. 620.03, Stone Filling (Light).

P. Sand: ASTM C33; fine aggregate.

2.2 FOAMED GLASS AGGREGATE

A. Foamed glass aggregate shall be made from a minimum of 98% recycled glass and shall be produced by the wet foaming process.

B. Basis of Design: Glavel

1. (802) 540-0843
2. info@glavel.com
3. 50 Lakeside Ave, Suite 861, Burlington, VT 05401

C. Foamed glass aggregate shall meet the gradation specifications in Table A per ASTM C136.

TABLE A

Sieve Size	Total % Passing
4”	100
2”	85-100
⅜”	0-15

D. The as-manufactured foamed glass aggregate shall have a maximum dry bulk density of 15 pounds per cubic foot (pcf) per ASTM C29. The as-delivered foamed glass aggregate shall have a maximum moist bulk density of 18 pcf per ASTM C29.

E. The foamed glass aggregate shall have a closed cell structure and shall be non-leaching.

F. The foamed glass aggregate manufacturer must demonstrate experience of manufacturing a minimum of 125,000 cubic yards of foamed glass aggregate meeting the requirements of this Section.

2.3 GEOTEXTILES

A. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M288 and conforming to NYSDOT Material Designation Table 737-01C and the NYSDOT’s Technical Services Approved List of Geosynthetics for Highway Construction.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M288 and conforming to NYSDOT Material Designation Table737-01B and the NYSDOT’s Technical Services Approved List of Geosynthetics for Highway Construction.

2.4 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Self-compacting, low-density, flowable concrete material produced from the following:

1. Portland Cement: ASTM C150, Type II.
2. Fly Ash: ASTM C618, Class C or F.
3. Normal-Weight Aggregate: ASTM C33, 3/4-inch or 3/8-inch nominal maximum aggregate size.
4. Foaming Agent: ASTM C869.
5. Water: ASTM C94.
6. Air-Entraining Admixture: ASTM C260.

B. Produce conventional-weight, controlled low-strength material with 200-psi compressive strength when tested according to ASTM C495.

2.5 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

3.1 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.

3.2 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. 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.
2. Provide and maintain at all times during construction, ample means and devices with which to promptly remove and dispose of all water from any source entering the excavations or other parts of the work area.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: 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 wide.

3.5 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. Excavation should be performed with increasing care as subgrade levels are approached. 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. All work should be performed in the dry. No topsoil, organic matter, existing utilities, or other unsuitable material should be left in place.

2. Excavation for Underground Manholes, 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. Protect excavated areas which are to support foundations or other work against freezing, by means of insulated blankets, hay or other approved methods. Where bearing areas have been subjected to frost penetration, remove affected material as directed by Director's Representative and pay for the cost of additional excavation, materials and construction necessary to rectify condition.

C. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, 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.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. 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: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

3.8 SUBGRADE INSPECTION

A. Notify Director's Representative when excavations have reached required subgrade.

B. If Director's Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted granular fill or common fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a with a non-vibratory roller 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 3 mph.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material 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 the Director's Representative, without additional compensation.

3.9 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 Director's Representative.

3.10 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.

3.11 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 underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, 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.

3.12 FOAM GLASS AGGREGATE BACKFILL

A. Install all underslab utilities, drains, and cleanouts before placing foamed glass aggregate. Backfill around utilities with foamed glass aggregate or clean sand to provide uniform support. Where plumbing or conduit is adjacent to or passing through foamed glass aggregate, maintain a minimum clearance of 6 vertical inches between the utility and any compaction equipment. Protect all pipes and structures from displacement or damage during compaction of foamed glass aggregate.

B. Place nonwoven geotextile directly over the prepared subgrade as a separation layer. Overlap adjacent panels a minimum of 12 inches or sew per manufacturer's recommendation. Extend geotextile up vertical faces of foundations, grade beams, or utility trenches as shown on the Drawings. Provide vapor barrier if called for.

C. Foamed glass aggregate shall be placed in maximum uncompacted lifts of 12 inches and compacted with a plate compactor 110-220 lbs. Compaction shall be complete after a minimum of four (4) full passes with the plate compactor. One (1) full pass is defined as a minimum of 100% coverage of the plate passing atop the lift.

D. If differing lift thickness, compaction equipment, or methods are proposed, obtain written approval from the Directors Representative prior to use. Provide supporting data or prior test results to confirm comparable density and volume reduction.

E. After compaction, place nonwoven geotextile directly over the compacted foamed glass aggregate as a separation layer. Place heavy-duty vapor barrier (e.g., 15-MIL Stego Wrap or approved equal) atop geotextile. Lap joints per manufacturer's recommendation and tape seams airtight. Protect vapor barrier from puncture during placement of reinforcing and concrete.

F. Prevent heavy equipment operation directly on compacted or uncovered foamed glass aggregate. Repair any disturbed areas prior to slab placement using the same methods specified above.

3.13 FILLING AND BACKFILLING STRUCTURES

A. Within Buildings or Other Structures

1. Place in layers of not more than 6 inches loose depth compacted with heavy equipment.
2. Place a minimum 6-inch compacted layer under all building slabs, excavating if required.
3. Grade smooth and even, free of voids, to required elevation. Provide final grades within a tolerance of ½ inch when tested with a 10-foot straightedge.

B. Exterior Slabs on Grade or Other Exterior Structures

1. Provide subbase course to depths indicated and placed in layers of not more than 6-inch loose depth.
2. Compact with heavy equipment.

3.14 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. 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.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with granular fill; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 03 30 00 "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 03 30 00 "Cast-in-Place Concrete."

E. Backfill voids with satisfactory soil while removing shoring and bracing.

F. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of bedding material to a height of 12 inches over the pipe or conduit.
   a. 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.

G. Final Backfill:

1. Soil Backfill: Place and compact final backfill, as per Contract Documents, to final subgrade elevation.

H. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.15 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 granular fill.
3. Under steps and ramps, use granular fill.
4. Under building slabs, use granular fill.
5. Under footings and foundations, use granular fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.16 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.

3.17 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 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 ASTM D1557:

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 95 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 95 percent.

3.18 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 elevations required to achieve indicated finish elevations, within the following subgrade 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.

3.19 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase course to required crown elevations and cross-slope grades.
4. Place subbase course 6 inches or less in compacted thickness in a single layer.
5. Place subbase 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.
6. Compact subbase 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 ASTM D1557.

C. Pavement Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase layer to not less than 95 percent of maximum dry unit weight according to ASTM D1557.

3.20 FIELD QUALITY CONTROL

A. Special Inspections: The Director will engage a qualified special inspector to perform the following special inspections; Coordinate with the testing agency and the Director’s Representative to facilitate execution of these tests.

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Testing Agency: The Director will 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 ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, 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.

3.21 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.

3.22 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 Director’s property.

END OF SECTION

SECTION 32 12 16
ASPHALT PAVING

PART 1 - GENERAL

1.1 DEFINITIONS

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definition of terms.

1.2 ACTION SUBMITTALS

A. Hot-Mix Asphalt Designs:

1. Certification, by New York State Department of Transportation (NYSDOT), of approval of each hot-mix asphalt design proposed for the Work.
2. For each hot-mix asphalt design proposed for the Work.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each paving material, from manufacturer.

1. Asphalt binder.

B. Field quality-control reports.

C. Environmental Product Declarations: Provide current Environmental Product Declarations (EPDs), that include the amount of embodied carbon in each product.

1. Acceptable EPDs are non-expired, Product-specific, Facility or Plant-specific, or Supply Chain specific Type III) Third-Party Reviewed), in adherence to ISO 14025 Environmental labels and declarations, ISO 14044 Environmental Management – Life cycle assessment, and ISO 21930 Core rules for environmental product declarations of construction products and services.
2. Provide the quantity / volume / weight (matching the units used in the EPDs) of each product incorporated into this project.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by NYSDOT.

B. Testing Agency Qualifications: Qualified in accordance with ASTM D3666 for testing indicated.

C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of NYSDOT for asphalt paving work.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the

following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F.
2. Asphalt Base Binder Course: Minimum surface temperature of 40 deg F and rising at time of placement.
3. Joint Sealant: Minimum surface temperature of 50 degrees F.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

C. Fine Aggregate: ASTM D1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: ASTM D242, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: ASTM D6373 binder designation PG 58-28.

B. Asphalt Cement: ASTM D3381 for viscosity-graded material ASTM D946 for penetration-graded material .

C. Tack Coat: ASTM D977 emulsified asphalt, or ASTM D2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

D. Water: Potable.

2.3 AUXILIARY MATERIALS

A. Joint and Crack Sealant: ASTM D6690, Type II or III, hot-applied, single-component, polymer-modified bituminous sealant.

2.4 MIXES

A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by NYSDOT, designed according to NYSDOT Design and Construction Division "Standard Specification", latest edition, and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

2. Binder Course: Complying with the requirements of NYSDOT, Type 3 Dense Binder, Section 401, Item 403.138902.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment 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 3 mph.
2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Director’s Representative, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.3 PATCHING

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching: Fill excavated pavements with hot-mix asphalt binder mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.4 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch .

1. Clean cracks and joints in existing hot-mix asphalt pavement.
2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

A. Ensure that prepared subgrade has been proof-rolled and is ready to receive paving. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.

B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.6 HOT-MIX ASPHALT PLACEMENT

A. Place the asphaltic concrete in strict accordance with the provisions of Section 401 through 405 of NYSDOT Standards.

B. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt binder course in number of lifts and thicknesses indicated.
2. Spread mix at a minimum temperature of 250 deg F.
3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

C. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to

overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.

2. Complete a section of asphalt binder course before placing asphalt surface course.

D. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.7 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method in accordance with AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.8 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density, Marshall Test Method: 96 percent of reference laboratory density in accordance with ASTM D6927, but not less than 94 percent or greater than 100 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.9 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce thickness indicated within the following tolerances:

1. Binder Course: Plus or minus 1/2 inch.

B. Pavement Surface Smoothness: Compact each course to produce surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Binder Course: 1/4 inch.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined in accordance with ASTM D3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement in accordance with ASTM D979.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared in accordance with ASTM D2041/D2041M, and compacted in accordance with job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples in accordance with ASTM D1188 or ASTM D2726.

   a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores taken.
   b. Field density of in-place compacted pavement may also be determined by nuclear method in accordance with ASTM D2950 and coordinated with ASTM D1188 or ASTM D2726.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from the Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow excavated or surplus materials to accumulate on-site.

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING

PART 1 - GENERAL

1.1 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to concrete paving, including but not limited to, the following:

   a. Concrete mixture design.
   b. Quality control of concrete materials and concrete paving construction practices.

2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:

   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete paving Subcontractor.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.

B. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.

5. Joint fillers.

C. Material Test Reports: For each of the following:

1. Aggregates.

D. Field quality-control reports.

E. Environmental Product Declarations: Provide current Environmental Product Declarations (EPDs), that include the amount of embodied carbon in each product.

1. Acceptable EPDs are non-expired, Product-specific, Facility or Plant-specific, or Supply Chain specific Type III) Third-Party Reviewed), in adherence to ISO 14025 Environmental labels and declarations, ISO 14044 Environmental Management – Life cycle assessment, and ISO 21930 Core rules for environmental product declarations of construction products and services.
2. Provide the quantity / volume / weight (matching the units used in the EPDs) of each product incorporated into this project.

1.5 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests must be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

1.6 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or

chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to 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 in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, fabricated from steel wire into flat sheets.

B. Reinforcing Bars: ASTM A615/A615M, Grade 60; deformed.

C. Tie Bars: ASTM A615, Grade 60; deformed.

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

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.4 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C150, gray portland cement Type I/II.

B. Normal-Weight Aggregates: ASTM C33, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C260/C260M.

D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C494, Type A.
2. Retarding Admixture: ASTM C494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.

E. Water: Potable and complying with ASTM C94.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.

2.6 RELATED MATERIALS

A. Joint Fillers: ASTM D1752, cork or self-expanding cork in preformed strips.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

B. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content, 3/4-inch Nominal Maximum Aggregate Size: 6 percent plus or minus 1-1/2 percent.

C. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing 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.

D. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 4500 psi.
2. Maximum W/C Ratio at Point of Placement: 0.45.
3. Slump Limit: 3 inches, plus or minus 1 inch.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94 and ASTM C1116. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 INSTALLATION OF STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 25 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer’s written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: ½ inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/2 inch.
4. Joint Spacing: 3 inches.
5. Contraction Joint Depth: Plus 1/4 inch, no minus.
6. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: The Director will engage a qualified testing agency to perform tests and inspections. Coordinate with the testing agency and the NYSOPRHP to facilitate execution of these tests.

B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172 will be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143; 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; 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; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39; test one specimen at seven days and two specimens at 28 days.

    a. A compressive-strength test to be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results to be reported in writing to Director’s Representative, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests to 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.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Director’s Representative but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Director’s Representative.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.11 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Director’s Representative.

B. Drill test cores, where directed by Director’s Representative, when necessary to determine

magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 92 00

TURF AND GRASSES

PART 1 - GENERAL

1.1 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

C. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

D. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.2 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Director’s Representative for maintenance of turf and meadows during a calendar year. Submit before expiration of required maintenance periods.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf and meadow establishment.

1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or American Hort.

2. Experience: Five years' experience in turf installation in addition to requirements in Section 01 40 00 "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.6 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: April 1 to June 1.
2. Fall Planting: August 15 to October 1.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Source: Provide from off site, Director’s Representative approved source, when stripped, stockpiled and amended quantity is inadequate to provide four (2") inches settled depth of topsoil for all lawn areas at no additional cost.

B. Texture and Content: Provide topsoil conforming to the following:

1. Soil texture and content:
   a. Sandy loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material. Topsoil shall be entirely free of dense material, hardpan, clay, stones over 3/4" in diameter, sod, or any other objectionable foreign material, including but not limited to, glass, debris, toxins,

hazardous wastes and chemicals (such as atrizene or muriatic acid within the past seven (7) years) that may be injurious to humans, animals and plant materials.

b. Organic Matter: Containing not less than 5% or more than 10% organic matter in that portion of a sample passing a 1/4" sieve when determined by the wet combustion method on a sample dried at 105 degrees F.

2. pH Value: Containing a pH value within the range of 6.0 to 7.0 on that portion of the sample which passes a 1/4" sieve.
3. Soluble salt content: Not higher than 500 parts per million.
4. Sieve Analysis for General Lawn Work: Shall be screened or rock picked to meet the following gradation:

   a. 3/4" sieve 100% passing
   b. 1/4" sieve 97-100% passing
   c. No. 200 sieve 20-65 percent passing

2.2 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species:

1. Quality, State Certified: State-certified seed of grass species as listed below for solar exposure.
2. General Lawn Seed Mix: Proportioned by weight as follows:

   a. 40 percent Kentucky bluegrass, 95 percent purity, 85 percent germination
   b. 35 percent perennial ryegrass, 98 percent purity, 90 percent germination
   c. 25 percent creeping red fescue, 97 percent purity, 85 percent germination
   d. Kentucky bluegrass blend shall contain no more than 25 percent of any one cultivar and always at least two (2) different cultivars.
   e. Perennial rye blend shall contain no more than 30 percent of any one (1) cultivar and always at least three (3) different cultivars.

3. Shade Lawn Seed Mix: For use in shaded areas of the site.

   a. 30 percent Chewing Fescue, 97 percent purity, 85 percent germination
   b. 30 percent Creeping Red Fescue, 97 percent purity, 85 percent germination
   c. 15 percent Hard Fescue, 97 percent purity, 85 percent germination
   d. 15 percent turf type perennial ryegrass, 98 percent purity, 90 percent germination
   e. 10 percent Kentucky Bluegrass, 95 percent purity, 85 percent germination

C. Temporary Seed Mix: Provide the following seed mix for temporary stabilization:

1. 100 percent annual ryegrass, 30 lbs/acre

2.3 FERTILIZER

A. The use and type of fertilizer proposed must be approved by the Director's Representative.

B. For Starter Fertilization: Immediately prior to seeding, fertilize with a commercial starter fertilizer, granular, non-burning product, with not less than 90% organic slow acting, micro nutrients and 1% iron, guaranteed analysis commercial fertilizer.

1. Fertilizer ratio shall be: (1-2-1). Apply at a rate of 0.33 – 0.66 lbs. of nitrogen (N) per 1,000 sf.

C. For Subsequent and Final Fertilization: Apply commercial fertilizer, poly coated granular non-burning product with not less than 90% organic slow acting, guaranteed analysis.

1. For Spring and Fall Lawn Work: Fertilizer ratio shall be: (3-0-1). Apply at a rate of 1.5 – 2 lbs. nitrogen (N)/1,000sf.

2.4 MULCHES

A. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

B. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.5 PESTICIDES

A. Pesticides are not approved for use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Director's Representative and replace with new planting soil.

3.2 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 SPREAD TOPSOIL

A. Limit turf preparation to areas to be planted immediately.

B. Perform topsoil spreading operations only during dry weather.

C. To ensure proper bond with the topsoil, disk, harrow or otherwise scarify and loosen subgrade to a minimum settled depth of 4 inches before spreading topsoil.

1. Spread topsoil to a depth of 2 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.

D. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 4 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
3. Remove stones larger than 3/4-inch in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off NYSOPRHP property

3.4 TURF AREA PREPARATION

A. Perform a pH test, sieve, and nutrient analysis of the topsoil and advise the results to the Director's Representative prior to adding limestone or other soil amendments. Soil amendments shall be uniformly incorporated into the top four (4") inches of topsoil by disking, harrowing or other approved methods.

B. Remove debris and stones 3/4" or larger by handpicking, fine tooth aluminum grading rakes, and mechanized stone picker or screening. When topsoil has hardened, cultivate soil to a four

(4") inch depth by plowing, disking, harrowing, or otherwise scarifying and loosening the topsoil.

C. Grade lawn areas to a smooth, free draining even surface with a loose, moderately coarse texture. Scarify, rake, level, and roll with a light static roller as necessary to obtain true, even lawn surfaces and fill depressions as required to drain. Correct irregularities in the surface resulting from tillage operations to prevent formation of depressions or water pockets.

D. Cultivate soil to provide a firm bed of minimum of four (4") inches deep, free of clods, stones, or foreign matter over 3/4" in diameter from the top of soil. Do not move heavy objects except necessary lawn making equipment over the lawn areas after the soil is prepared unless it is again loosened and graded. Remove stones and all debris greater than one 3/4" in diameter during cultivation. Level undulations and irregularities in the surface.

E. For pH correction, provide adjusted rate of application as recommended in Topsoil Test Report submittal. For low pH correction: Add ground limestone at the rate indicated by the soil test. For high pH correction: Materials and application rates shall be determined by appropriate soil tests.

F. Place starter fertilizer at the rate of 0.33 – 0.66 lbs. of nitrogen (N) per 1,000 sf. and mix into full depth of topsoil.

G. Rake area with fine toothed aluminum grading rake before placing seed to obtain a smooth surface at the proper elevation. Drag area with a wood float to level out minor humps and hollows. Beds shall have a smooth friable uniform surface, free of areas ponding water.

H. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus ½-inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

I. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

J. Before planting, obtain Director’s Representative acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.5 HYDROSEEDING

A. Notify Director’s Representative when seed bed is ready for review as specified in Project Conditions. Obtain Director’s Representative approval of finish grade prior to hydroseeding.

B. Hydroseed lawns immediately after preparation of bed and Director’s Representative approval.

C. Hydroseeding: Mix specified seed, starter fertilizer and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with nonasphaltic tackifier.
2. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1,500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

D. Application Rate:

1. Sow general lawn seed mix at a total rate of 5 to 8 lbs/1,000 sq. ft. or as recommended by the seed supplier.
2. Sow shade seed mix at a total of 5 lbs/1,000 sq. ft. or as recommended by the seed supplier.

E. Protect seeded areas with slopes exceeding 1:3 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

3.6 TURF RENOVATION

A. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

B. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

C. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

D. Mow, dethatch, core aerate, and rake existing turf.

E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Director’s Representative property.

G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 4 inches.

H. Apply hydroseed as required for establishing new turf.

I. Water newly planted areas and keep moist until new turf is established.

3.7 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll,

regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Kentucky bluegrass chewings red fescue perennial ryegrass to a height of 1-1/2 to 2 inches.

D. Turf Postfertilization: Apply commercial fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.8 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Director’s Representative:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.9 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Director's Representative property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.10 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Seeded Turf: 90 days from date of Substantial Completion.

a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

END OF SECTION

SECTION 33 14 15

SITE WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 DEFINITIONS

A. PE: Polyethylene plastic.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Submittals:

1. Field quality-control reports, including, but not limited to, chlorination and disinfection testing.

B. As-Built Drawings.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements

1. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

D. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping.
2. Comply with NSF 61 Annex G for materials for water-service piping and specialties for domestic water.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare piping and valves according to the following:

1. Ensure that piping and valves are dry and internally protected against rust and corrosion.
2. Protect threaded ends and flange faces against damage.
3. Set piping and valves in best position for handling and to prevent rattling.

B. During Storage: Use precautions for piping and valves according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle products if size requires handling by crane or lift. Rig products to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Director or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service in accordance with requirements indicated:

1. Notify Director's Representative no fewer than 5 days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Director's Representative's written permission.

1.7 COORDINATION

A. Coordinate connection of domestic water well to the building’s water service with the Director's Representative.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with standards of authorities having jurisdiction for domestic water-service piping, including materials, installation, testing, and disinfection.

B. Piping materials to bear label, stamp, or other markings of specified testing agency.

C. Comply with ASTM F645 for selection, design, and installation of thermoplastic water piping.

D. All piping and appurtenances intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), with requirements of the Authority Having Jurisdiction (AHJ), and with NSF 61/NSF 372 or are certified in compliance with NSF 61/NSF 372 by an ANSI-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 PIPING MATERIALS

A. Comply with requirements in "Piping Applications" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and service sizes.

B. Potable-water piping and components comply with NSF 14, NSF 61, and NSF 372. Include marking "NSF-pw" on piping.

2.3 PE PIPE AND FITTINGS

A. PE, AWWA Pipe: AWWA C901, copper tube size (CTS), SDR9 (250 PSI).

1. CTS Fittings: Compression, AWWA C800 brass, certified lead-free.

2.4 PIPING JOINING MATERIALS

A. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.5 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Tubular-Sleeve Pipe Couplings: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.

1. Standard: AWWA C219.
2. Center-Sleeve Material: Stainless steel.
3. Gasket Material: Natural or synthetic rubber.
4. Pressure Rating: 250 psig minimum.
5. Metal Component Finish: Corrosion-resistant coating or material.

2.6 CURB STOPS

A. Curb Stops: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

1. Service Boxes for Curb Valves: ASTM A48, Class 25 cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in diameter.

a. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

2.7 CORROSION-PROTECTION PIPING ENCASEMENT

A. Encasement for underground metal fittings and valves:

1. Standards: ASTM A 674 or AWWA C105.
2. Form: Sheet or tube.
3. Material: LLDPE film of 0.008-inch minimum thickness, or high-density, cross-laminated PE film of 0.004-inch minimum thickness.
4. Color: Black
5. Install per manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with excavating, trenching, and backfilling requirements in Section 31 20 00 "Earth Moving."

3.2 PIPING APPLICATIONS

A. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used unless otherwise indicated.

B. Do not use flanges or unions for underground piping.

C. Underground water-service piping to be the following:

1. PE, AWWA pipe; CTS fittings AWWA C800 brass compression joints.

3.3 VALVE APPLICATIONS

A. General Application: Use curb valves with ends compatible with piping.

3.4 INSTALLATION OF PIPING

A. Make connections to existing pipes utilizing tees and/or couplings.

B. Install PE pipe in accordance with ASTM D2774, ASTM F645, and AWWA C901.

C. Bury piping with depth of cover as indicated on the Contract Drawings.

D. Extend water-service piping and connect to water-supply source and building water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water-piping systems when those systems are installed.

3.5 JOINT CONSTRUCTION

A. Make pipe joints according to the following:

1. PE Piping Insert-Fitting Joints: Make joints in accordance with fitting manufacturer's written instructions.

3.6 INSTALLATION OF VALVES

A. Curb Stops: Install each underground curb valve with head pointed up and with service box.

3.7 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50 psig increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to 0 psig. Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.8 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 31 20 00 "Earth Moving."

B. Permanently attach equipment nameplate or maker indicating plastic water-service piping on main electrical meter panel.

3.9 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in

NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
   a. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for three hours.
   b. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
   c. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION

SECTION 33 41 00

STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Codes and Standards

1. Comply with the provisions of the following codes and standards except where more stringent requirements are shown or specified.

   a. Local Regulations.
   b. New York State Department of Transportation (NYSDOT) Standard Specifications, latest edition.
   c. New York State Department of Environmental Conservation (NYSDEC) SPDES General Permit for Stormwater Discharge from Construction Activity, GP-0-20-001.

1.2 SUBMITTALS

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

1. Drainage piping and fittings.
2. Drainage fabric.
3. Rip Rap stone.
4. Drainage pipe end section.

B. Product Certificates: For each type of drainage pipe and fitting, from manufacturer.

C. Field quality-control reports.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic pipe and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.4 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by the NYSOPRHP or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Director’s Representative no fewer than two days in advance of proposed interruption of service.

2. Do not proceed with interruption of service without Director's Representative written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC gravity solid piping

1. Pipe and Fittings: ASTM D3034, SDR 35 wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

2.2 HIGH DENSITY CORRUGATED POLYETHYLENE PIPE (HDPE) AND FITTINGS

A. Provide heavy duty, high density corrugated polyethylene smooth interior pipe, joints, and fittings, capable of bearing highway traffic loads.

B. Corrugated HDPE drainage pipe and fittings NPS 12 to NPS 60, AASHTO M294, Type S with smooth waterway.

1. Pipe shall be joining using bell & spigot joint meeting AASHTO M294. The joint shall be soil tight and gaskets shall meet the requirements of ASTM F477.
2. Fittings shall conform to AASHTO M294. Bell and spigot connections shall utilize a welded bell and valley or saddle gasket meeting the soil-tight joint performance requirements of AASHTO M294.

C. Manning's "n" value for use in design shall not exceed 0.012.

D. Pipes shall be joined with bell and spigot joint. The bell shall be an integral part of the pipe.

1. The joint shall use a gasket to form a silttight connection. Gaskets shall be installed in the bell by the pipe manufacturer.
2. Joints shall remain silttight.

E. Pipe shall support H-20 loads with 12" minimum cover.

2.3 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Ring-Type, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements.
2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.4 CLEANOUTS

A. PVC Cleanouts:

1. Pipe: ASTM D 3034, SDR 35, size to match storm drain line.
2. Cleanout Plug: PVC SDR 35 threaded plug and cleanout ferrule size to fit pipe.
3. Cleanout Box Frame and Lid: Subject to compliance with the requirements of ASTM A 48, provide East Jordon Iron Works Model #3671, 6” tall bolted cleanout box assembly. Cover shall be lockable (apt bolt), have an asphaltic coating, and be labeled “STORM”. Provide cast-in-place concrete collar as indicated on the Contract Documents when cleanout is not placed within concrete pavement.

2.5 END SECTIONS

A. Unless noted otherwise, pipes 6" diameter and greater shall utilize galvanized steel flared end sections on all inlet and outlet pipes as indicated on the Drawings.

2.6 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.

2.7 DRAINAGE GEOTEXTILE

A. See Specification Section 31 20 00 – Earth Moving.

2.8 RIP RAP STONE

A. See Specification Section 31 20 00 – Earth Moving.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 31 Section "EARTH MOVING."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

D. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow.
2. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
3. Install HDPE corrugated sewer piping according to ASTM D 2321.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
2. Join corrugated HDPE piping according to ASTM D 3212 for push-on joints.
3. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.5 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
2. Reinspect and repeat procedure until results are satisfactory.

3.6 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with water.

3.7 MAINTENANCE

A. Settling

1. Where settling is measurable or observable over storm or subdrainage lines during construction and general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work and eliminate evidence of restoration to greatest extent possible.

END OF SECTION

SECTION 34 41 13

TRAFFIC SIGNS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. All traffic control signage shall conform to the Manual of Uniform Traffic Control Devices (MUTCD) and New York State Department of Transportation (NYSDOT) standards.

1.2 SUBMITTALS

A. Shop Drawings: Show shop drawings, not necessarily to scale, but sufficient enough in detail to show color, wording, lettering size and style, overall sign size, construction details and installation details for each type of sign.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Construction Materials: Comply with applicable requirements of DOT Section 645.

B. Signs: Standard 0.060 minimum aluminum with predrilled holes and baked enamel finish, silkscreen graphics and lettering per MUTCD and NYSDOT standards.

C. Posts: WRCL Western Red Cedar, rough sawn, standard grade per Construction Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erect signs in their designated locations, as indicated on the Contract Documents and in accordance with the approved shop drawings and the applicable requirements of DOT Section 645.

B. Erect sign plumb. Install posts into ground and backfill with compacted granular fill.

C. Mount signs at heights indicated. Attach metal signs to wood posts securely with corrosion resistant through bolts.

D. Protect surfaces and finishes from abrasion and other damage during handling and installation.

E. Replace damaged or faulty signs.

END OF SECTION